In This Issue—*Installing the Flat Rate System*

AUG 19 1921

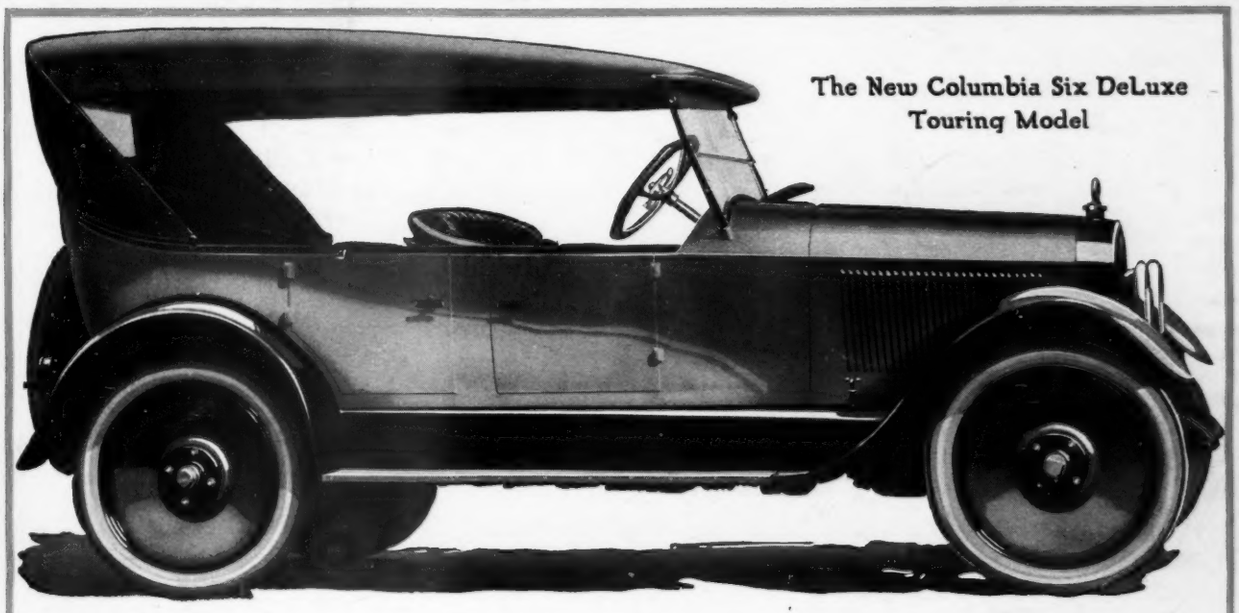
MOTOR AGE

Vol. XL
Number 7

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, AUGUST 18, 1921

Thirty-five Cents a Copy
Three Dollars a Year

The New Columbia Six DeLuxe Touring Model



The Car With No Competition

$1475

The Columbia Line

DeLuxe Touring, 5 passenger	*$1475*
Sport Model, 4 passenger	*1475*
Roadster, 2 passenger	*1475*
Coupe, 4 passenger	*2295*
Sedan, 5 passenger	*2350*

The above are equipped with cord tires

Challenger Touring, 5 passenger $1195

Challenger Coupe, 4 passenger	*$1995*
Challenger Sedan, 5 passenger	*1995*

The Columbia Motors Company announces this new Special Touring Model—made of new materials all the way through, bought at present low market prices. The price is $1475. Some excellent territory is open to dealers and distributors. Write or wire for proposition.

Specifications of the DeLuxe Touring Model

Continental motor—Timken axles—Auto Lite starting and lighting system—Stromberg carburetor—Harrison radiator—Borg & Beck clutch—Spicer universal joints—Durston transmission—Gemmer steering gear—non-synchronizing spring suspension—permanent top—plate glass windows—Cowl ventilator—thermostatically controlled radiator shutters—equipped with Penberthy flometer—Firestone and Goodrich cord tires—wheel base 115 inch. Disteel Wheels extra.

The Columbia Motors Company, Detroit, U. S. A.

Columbia Six

Entered as second class matter Sept. 19, 1899, at the post office at Chicago, Ill., under Act of March 6, 1879.

TIP TOP TIPTON
PISTON RING TOOL

Does the Fussy Piston Jobs Without Fuss—

$2

Piston ring jobs are about the meanest you have in your shop. For the size of the job there is a terrible lot of trouble, breakage, waste of time and labor and material.

The Tipton Piston Ring Tool enables your mechanics to do these fussy little jobs without fuss. It elminates the danger of breaking or twisting rings and of injuring fingers. It stops the waste which has been coming out of your profits. It lets you do more work in less time.

The Tipton Piston Ring Tool is a two purpose tool.

The upper illustration shows it being used for its first purpose, putting on or removing rings. It takes any one-joint ring, which includes 95% of all rings. The claws are inserted at the cut and the long arms squeezed. This expands the ring uniformly until it slips easily over the piston either out of or into its proper groove.

The illustration at th eright shows its second use—cleaning carbon from the piston grooves. The specially hardened saw-edge of the long arm gets into the farthest corners of the groove and cleans out all the carbon in two or three turns.

With the Tipton Tool your men can take off a set of rings, clean the grooves **clean,** and replace the rings in the time they now take to do one of these operations. Isn't that tool worth $2 to your business on that count alone?

Regular Discount to Dealers and Jobbers

Made of Fine Tempered Steel

TIPTON MFG. CO.

TIPTON **IOWA**

MOTOR AGE

Published Every Thursday by

THE CLASS JOURNAL COMPANY

MALLERS BUILDING

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Vol. XL AUGUST 18, 1921 No. 7

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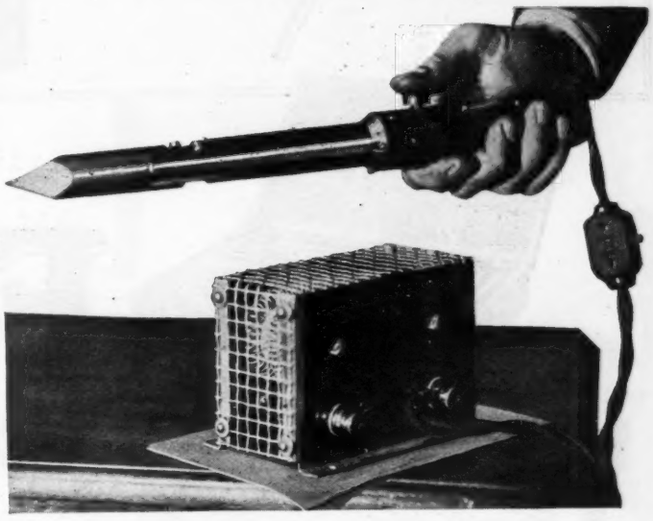
CARBON ARC
SODERWAND
"Solders Like Magic"



Instant, Intense Heat

The Baco Carbon Arc Soderwand is ready for use in less than a minute after the current is switched on.

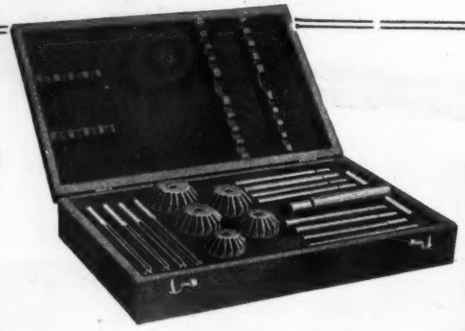
The carbon arc, the most intense heat known to science, keeps the copper point at the right soldering temperature until the job is finished.

The Baco Soderwand never gets too hot or too cool, you have control of the arc right under your thumb. The saving in current consumption alone over other type irons more than pays for the Baco.

The Baco is simple and efficient. You can cut your soldering costs in half, do better work, and increase your profits.

Send today for literature and prices. Baco is making money for others, it will do the same for you.

BACO ELECTRIC COMPANY
Bode, Iowa



Announcing

Flexedge VALVE TOOLS

These tools were designed to meet the insistent demand for a strictly high quality set of valve tools that would eliminate various common complaints.

Particular attention has been given to assure perfect alignment of the pilot and angle cutter. The cutter heads have an even number of teeth, half of which are cut radial with the center, each intermediate tooth being nearly parallel to the one preceding it. Chatter is thereby entirely eliminated.

An important feature of this set is the complete line of oversize reamers and pilots. This makes it a simple matter to rectify any misalignment in either the seat or guide. From the end of the reamers up to about 5/16" the teeth are cylindrically ground. This part functions as a pilot or guide. Extending from this point for about 3/8" the teeth are tapered, which allows the reamer to take a gradual cut.

The tool steel used is the very highest grade obtainable, scientifically hardened and tempered. Reamers, pilots and cutter heads are made in all sizes—standard, standard oversizes and special. The set illustrated is complete enough to take care of the average garage or repairshop requirements.

Sold either in sets or individually. Each tool absolutely guaranteed.

See your jobber or write for literature and complete information.

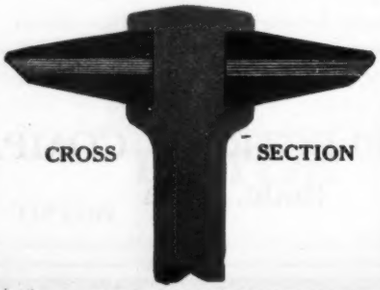
THE SELF SEATING VALVE COMPANY
340 W. Huron St., CHICAGO

Flexedge
VALVES You Never Need Grind

The national success of this valve is due to its construction. The head is made of laminations held between heavy top and bottom plates, instead of being one solid piece.

As the head strikes the seat under the tremendous pressure of the closing stroke the edges of the laminations are flexed slightly, which frees the seat of carbon deposits and keeps it bright and clean. The valve, therefore, always seats perfectly and is compression—tight.

Your jobber can supply you.



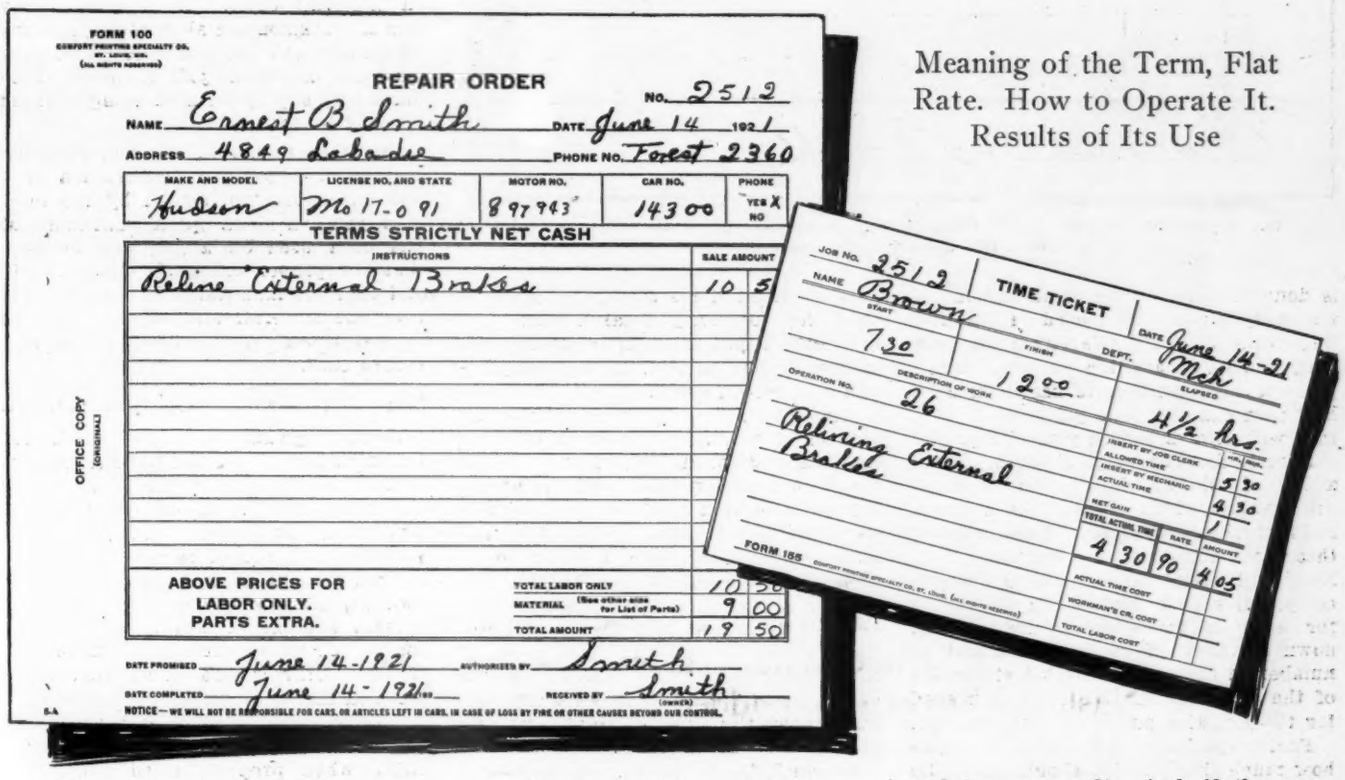
CROSS SECTION

VOL. XL, No. 7 CHICAGO, AUGUST 18, 1921 $3.00 Per Year

MOTOR AGE

Installing the Flat Rate System

Meaning of the Term, Flat Rate. How to Operate It. Results of Its Use



FORM 100

REPAIR ORDER No. 2512

NAME Ernest B Smith DATE June 14 1921

ADDRESS 4849 Labadie PHONE NO. Forest 2360

MAKE AND MODEL	LICENSE NO. AND STATE	MOTOR NO.	CAR NO.	PHONE YES X NO
Hudson	Mo 17-091	897943	14300	

TERMS STRICTLY NET CASH

INSTRUCTIONS	SALE AMOUNT
Reline External Brakes	10 50

OFFICE COPY (ORIGINAL)

ABOVE PRICES FOR LABOR ONLY. PARTS EXTRA.

TOTAL LABOR ONLY	10 50
MATERIAL (See other side for List of Parts)	9 00
TOTAL AMOUNT	19 50

DATE PROMISED June 14-1921 AUTHORIZED BY Smith (OWNER)

DATE COMPLETED June 14-1921 RECEIVED BY Smith

NOTICE—WE WILL NOT BE RESPONSIBLE FOR CARS, OR ARTICLES LEFT IN CARS, IN CASE OF LOSS BY FIRE OR OTHER CAUSES BEYOND OUR CONTROL.

JOB NO. 2512 TIME TICKET

NAME Brown DATE June 14-21

START 730 FINISH 1200 DEPT. Mch

OPERATION NO. 26 DESCRIPTION OF WORK Relining External Brakes

ELAPSED 4½ Hrs.

	HR.	MIN.
INSERT BY JOB CLERK ALLOWED TIME	5	30
INSERT BY MECHANIC ACTUAL TIME	4	30
NET GAIN	1	

TOTAL ACTUAL TIME	RATE	AMOUNT
4 30	90	4 05

ACTUAL TIME COST

WORKMAN'S CR. COST

TOTAL LABOR COST

FORM 185

The repair order and time ticket, two essential forms to be used in the operation of the flat rate system

THE present-day tendency in business is toward standardization of prices. People expect to pay the same for a certain service or for certain merchandise at one time as at another. A man can go into a restaurant and find the price of every dish listed on a printed menu card. He knows in advance just what his meal will cost. Or, he can go into a barbershop, and there on the wall he will see a list of prices. He can tell beforehand just what his shave or haircut is going to cost.

But suppose this man takes his automobile to a repairshop for work. He asks, "What will it cost?" Is he given a definite answer? No. Nine times out of ten he is told, "Oh, it will cost about $17"—or whatever the repairman guesses will cover the cost of labor and material and leave a profit. And, if the guess happens to be a poor one, and the cost plus a reasonable profit amounts to more than the estimated $17, the repairman either makes no profit or the car owner has to pay more than he expected.

MANY service stations have given the flat rate system thought of late with a view towards its establishment in their organizations. Many have been somewhat at a loss as to the manner of procedure.

MOTOR AGE presents herewith an article intended for those who wish to know more about the installation of the flat rate system. This article has been prepared by W. G. Eiben, vice-president of the Comfort Printing Specialty Co., St. Louis, Mo. Mr. Eiben has done considerable field work, visiting many hundreds of service stations for the purpose of studying the requirements for installation and working out successfully of the flat rate system.

No doubt every dealer has heard of the flat rate system. There have been articles about it in the automobile trade magazines. But possibly he has not considered just how a flat rate system works or just how to go about using it. There is every reason to believe many progressive repairmen will use it if they can find a way of putting it in without too much trouble.

Same Charge for the Same Work

Obviously, the first thing necessary is to decide upon a certain set price for each particular repair job. That's all a flat rate is—the same charge every time for the same work. Now, 80 to 90 per cent of all automobile repairing consists of what might be called "standard" jobs. That is, each time any one of these jobs

FORM 46 REQUISITION ON STOCK ROOM Date 6/14/21

Owner Ernest B. Smith Repair Order No. 2512

Make of Car Hudson Model

COMFORT PRINTING SPECIALTY CO. ST. LOUIS MO. (ALL RIGHTS RESERVED)

QUANTITY REQUIRED	PART NO.	ARTICLE	PRICE	AMOUNT	
96"		External Brake Lining		9	00
			TOTAL		

Ordered by Brown. O. K. Frank Foreman

The requisition on the stock room must be approved by the foreman and protects the organization against loss

is done, it requires the same amount of material, but the time used in doing it may vary a little. Variation in time used means a variation in cost. Since price to the customer is based on cost, how then can you set a price for the job that will always assure you of a profit?

Here is the way to go about it. Make a list of all "standard" jobs, such as grind valves, clean carbon, check timer, reline brake and so on. Then number these jobs consecutively, beginning with Number 1. Next fill out a card like the comparative cost card shown on page 9 for each of these operations, writing down the name of the operation and its number in the space provided at the top of the card. If any material is needed for the job, also put down this material.

Past experience will indicate about how much time the job should take. So put down in the space provided the average amount of time.

Now what do you have?

Have the Actual Cost of Material

You have a list of standard repair jobs, each one numbered for convenience in referring to it. You have the actual cost of material and the estimated cost of time for any particular job. Add to this cost as much as is needed to take care of overhead expense and bring a profit, and you have the price to the customer for that job. Enter this price on the card. It is, for the time being, the flat rate for that job.

After starting in this manner a file of such comparative cost record cards, one for each standard repair job, all that remains to do is to check up the costs on a certain number of jobs, say, ten of each, to see that the prices you have established are correct. For this you need a job time ticket. Every time one of your workmen does a repair job, have him fill out one of these tickets. He puts down on it his name, the work he does and how long it takes him. The information you gain from these time tickets is then entered on the comparative cost record cards.

Thus the actual time used in doing any one job can be compared with the time allowed for it. When any one job has been done ten times and the proper entries have been made on the comparative cost record card for that job, take an average of the time used on ten of the jobs and compare it with the time allowed in the beginning. If the average actual time is less than the time allowed the flat rate charge can be lowered. If it is higher, it may be raised. Thus is easily established a fair price to the customer, assuring you a profit, and this price can be maintained in the future.

So much for the actual establishing of a flat rate system of charges for repair work. In order to use a flat rate system to best advantage and to guard against mistakes, there are three order forms really essential. They are the repair order, the additional work order and the stockroom requisition.

Let us consider the repair order first. When a car comes in for repairs the owner of the car frequently does not know just what needs to be done to it.

A workman then goes over the car and puts down on the repair order what needs to be done. Then by reference to the file of comparative cost record cards, the charge for doing the work will be found. Put this charge down on the repair order, show it to the customer, and if he agrees to the work and the price, have him sign it. Thus you have a record of just what is to be done, and you have the customer's written O. K. to go ahead and do it.

Frequently while doing the repair job, the workman will discover that the car needs repairs in addition to those authorized by the customer. Here the additional work order comes in.

When the workman tells you of the need for additional repairs, get in touch with the customer. The customer generally says, "Go ahead and fix it." You then make out an additional work order, covering the needed additional repairs, and attach it to the repair order. This gives your workman written instructions for the additional work. It also reminds you that a charge has to be made besides the flat rate for the work originally entered on the repair order. And it shows the customer just what he pays for in addition to what he originally authorized.

Now let us consider the stockroom requisition which acts as a safeguard on material costs. It is quite likely that if workmen are allowed to go to the stockroom and get whatever parts they need for a repair job, some of those parts may slip by without being charged to the customer.

But if parts can be obtained from the stockroom only upon presentation of a written requisition, signed by the foreman, you can check up on what material has been used on a job, and be sure that the proper charge is made for it, and that the material used does not exceed the material allowed for that job as put down on the comparative cost record card.

Gives You Line on Efficiency of Workmen

Besides giving standard prices for standard repair jobs the flat rate system will do something else for you. It will give you a line on the efficiency of your workmen. In making out your comparative cost record cards you allow a certain amount of time—and a sufficient amount, of course,—for the doing of a certain amount of work. In checking up the job time tickets you can find out if the workmen are doing that much work in that much time.

To return to the forms—one of the illustrations shows how the repair order looks when properly filled out. The price in this case ($19.50) was found by referring to the comparative cost record card. The repair order comes in triplicate—a white sheet, your office copy, a yellow sheet, the customer's invoice, and a cardboard sheet, the workman's instruction card. All three sheets can be made out at one writing by the use of carbon paper. On the back of the white sheet and of the yellow sheet the parts used for the job can be listed. On the back of the cardboard sheet the time spent on the job can be recorded.

Notice the figures in the lower right-hand corder—$10.50 for labor and $9 for material—total $19.50. Nine dollars is the exact cost of material used. But the $10.50 charge for labor includes the profit on the job. The average cost of labor for this job, as you can see by referring to the comparative cost record card, is $4.27. It is advisable to include profit in the labor charge because it simplifies accounting.

It will be noticed the time ticket bears the same serial number, 2512, as the re-

pair order. For convenience in keeping track of jobs all repair orders should be numbered consecutively and all other records pertaining to any job should bear the same number that appears on the repair order. The time ticket also bears the workman's name, the time he started, the time he finished, the description of the work and the time allowed for doing it. In this case the time allowed was 5 hrs. and 30 min. But Brown, being a good workman, completed the job in 4 hrs. and 30 min., a net gain of 1 hr.

Now, supposing the repair order had called for several operations besides relining the external brake. Obviously, one of these time tickets would have to be made out for each of those operations.

Supplies Check on Material

The stockroom requisition gives a stockroom record and a job record of material used on a repair job. It also supplies a check on material, preventing waste or misuse. The illustration shows the stockroom requisition for the brake relining job we have been discussing. The workman, getting his part of the repair order—the instruction card—noticed that the job would require 96 in. of brake lining. He made out a requisition, had the foreman O. K. it and presented it at the stockroom.

This requisition is in duplicate. The stockroom clerk kept the original for his files. And the workman kept the duplicate with the repair order. When the job was completed the workman turned in all his records—his repair order instruction card, his time ticket, his additional work order and his duplicate of stockroom requisition. To check up on the job—to see that it was done in the allotted time or less, and that only the material called for was used—was then an easy matter.

The backbone of the flat rate system is the comparative cost record card. In filling out the one illustrated, this is what was done: The nature of the work was written in, "reline external brake." Next the amount of material needed for the operation and the cost of it, "96 in. of brake lining, $9." Then 5½ hrs., a liberal estimate of the time required for the job, was put down under "time allowed." The wage scale in this shop called for 90c an hour. Five and a half hours at 90c an hour came to $4.95. That was the cost for labor for this job. Nine

dollars, the cost for material, was added, and thus a total cost for the job of $13.95 was arrived at. Figuring in overhead expense and profit brought the price to the customer—$19.50.

As repair orders calling for relining of external brakes came in, time tickets were made out. The information on these time tickets was posted on the comparative cost record card. The fourth entry covers the time ticket. Worthy of note is the fact that in no instance did the cost for labor equal the estimated $4.95. The average cost for labor on any one of the ten jobs was $4.27—a difference of 68c in the repairman's favor on each job.

The reader will recall the repair order authorized merely the relining of the external brake. While doing that work the mechanic discovered that the emergency brake needed adjusting. Upon being told of this the customer said, "All right, adjust it." That called for the additional work order. This should be attached to the repair order and should bear the same serial number. Notice that the price of doing the work authorized on the repair order is added to the price for this extra work, thus furnishing the customer an itemized bill.

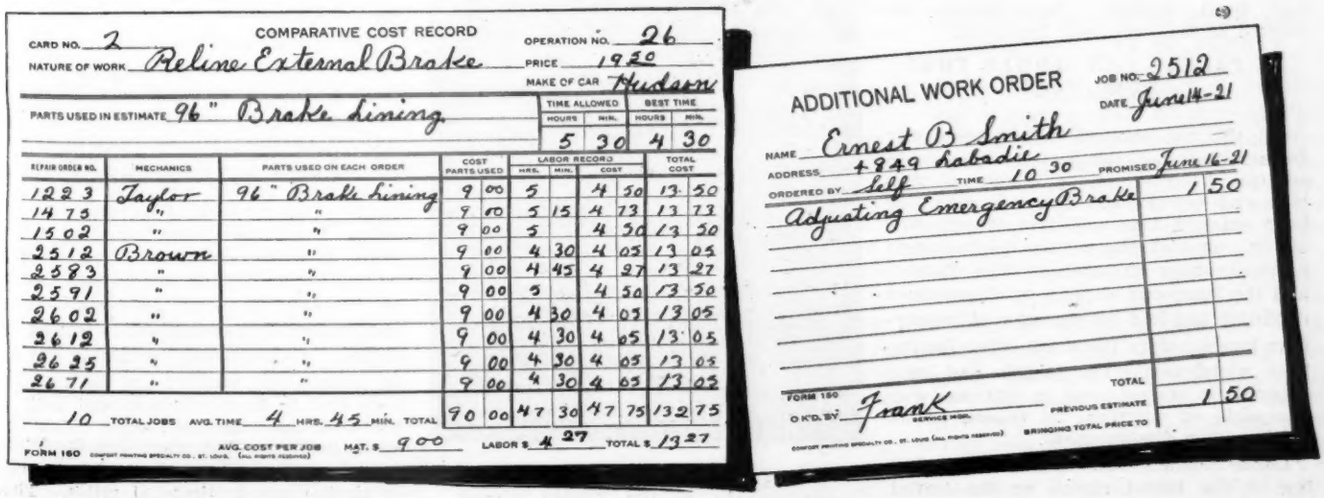
Speaking of the fairness of the flat rate system, it is interesting to note what Mr. Percy Chamberlain, long a strong advocate of this system, has to say. He says there are practically no bad points, and goes on:

Price Determined by Average

"The price is never determined on a basis of two jobs, one taking 2¼ hrs. and the other taking two men 5 hrs. There are always those two jobs, but the flat rate price is determined on a basis of a hundred or several hundred jobs. Thus the few long-time jobs add but a mite to the average.

"If a service manager will pick 25 cars in the hands of 25 owners and keep track of the repair work on them for a year, he will get some real information which will set his mind at rest along this line.

"Then, too, this fact is always overlooked: accompanying the flat rate must go an understanding of how to make an intelligent estimate. If a wreck is towed in, it does not destroy the theory or practicability of the flat rate to treat it as a special matter for individual estimate or pricing. The fact of the matter is that such operations as straightening an axle, taking dents out of fenders and things of that nature are usually not priced in advance. They are estimated in each, the estimate becoming the flat rate for that job. Why not work on them on the per hour basis? Because, as stated, we must eventually get away from the per hour idea. Neither employee nor customer should have it in mind. The time put in on an operation should be used only in calculating averages determining costs."



COMPARATIVE COST RECORD

CARD NO. 2 — OPERATION NO. 26

NATURE OF WORK Reline External Brake — PRICE 1920

MAKE OF CAR Hudson

PARTS USED IN ESTIMATE 96" Brake Lining — TIME ALLOWED 5 HRS. 30 MIN. — BEST TIME 4 HRS. 30 MIN.

REPAIR ORDER NO.	MECHANICS	PARTS USED ON EACH ORDER	COST PARTS USED	LABOR RECORD HRS.	LABOR RECORD MIN.	LABOR RECORD COST	TOTAL COST
1223	Taylor	96" Brake Lining	9 00	5		4 50	13 50
1475	"	"	9 00	5	15	4 73	13 73
1502	"	"	9 00	5		4 50	13 50
2512	Brown	"	9 00	4	30	4 05	13 05
2583	"	"	9 00	4	45	4 27	13 27
2591	"	"	9 00	5		4 50	13 50
2602	"	"	9 00	4	30	4 05	13 05
2612	"	"	9 00	4	30	4 05	13 05
2625	"	"	9 00	4	30	4 05	13 05
2671	"	"	9 00	4	30	4 05	13 05
10 TOTAL JOBS	AVG. TIME 4 HRS. 45 MIN.	AVG. COST PER JOB	90 00	47	30	47 75	132 75

FORM 150 — MAT. $ 9 00 — LABOR $ 4 27 — TOTAL $ 13 27

ADDITIONAL WORK ORDER — JOB NO. 2512 — DATE June 14-21

NAME Ernest B Smith

ADDRESS 4849 Labadie — PROMISED June 16-21

ORDERED BY Self — TIME 10 30

Adjusting Emergency Brake	1 50
TOTAL	
PREVIOUS ESTIMATE	1 50
BRINGING TOTAL PRICE TO	

FORM 150 — O K'D. BY Frank (SERVICE MGR.)

Here are two important forms, the comparative cost record and the additional work order. The former is a check on the operation of the system and shows the variation in time consumed for a given operation

America Shows Old World Its Finest Race

Both Industry and Public in Europe Agree That Murphy's Winning of the Grand Prix Was Capital Demonstration

By W. F. Bradley
(*European Correspondent*, MOTOR AGE)

LE MANS, France, July 25—In winning the French 182 cu. in. Grand Prix automobile race, at an average of 78.1 miles an hour, Jimmie Murphy not only established a speed record for long distance road racing in France, but gave the finest demonstration ever seen in the Old World. In the opinion of his rivals and the public alike, the best combination of car and driver won the race.

American prestige has been enormously enhanced by the Duesenberg's victory in France. The winning was so fair, there was such an absence of the element of chance, that all open-minded spectators admit the best car won.

Boyer's Duesenberg went out with a broken rod, but Chassagne's Ballot was eliminated with a broken axle. Jimmy Murphy was overheating when he finished, but this was due to a leaky radiator punctured by a flying stone.

Murphy got into his Duesenberg still suffering from his accident of a week before, when, owing to the seizure of the brakes, he overturned in the ditch. He was carrying Louis Inghibert, who had been scheduled to drive No. 4 Duesenberg. Both men were pinned under the car. Inghibert was taken to the hospital with four broken ribs, but although the French doctors declared that Murphy had no fractures, he suffered so much that he believed one rib had been broken. Nevertheless, he started in the race well bandaged.

DE PALMA'S CAR SLOWER THAN EXPECTED

All the competition lay between the Duesenberg and the Ballot teams. In addition to these two a couple of Talbots and two French Darracq cars had been entered, also a Mathis of only 91.5 cu. in., or half the piston displacement allowed under the rules. The Talbots and the Darracqs were in an unprepared condition and had been reentered twenty-four hours before the start, after having been withdrawn. The Mathis had been delayed by strikes, and in addition was incapable of winning, by reason of its small piston displacement.

Louis Wagner burned the fabric lining of the Ballot clutch on the initial lap and after losing a quarter of an hour in making repairs, and being further delayed by sticking throttles, he did not figure as a serious contestant. Ralph De Palma, looked upon by the public as the fastest of the Ballot quartette, did not seem to have the speed that was expected of him, and admitted after the race that his car was five miles an hour slower than when he drove it in America. He also was delayed by sticking throttle barrels. This defect was overcome by fitting extra springs, but not until a certain amount of time had been lost on the turns.

Owing to the accident to Louis Inghibert, the fourth Duesenberg had been given to Andre Dubonnet, a French millionaire amateur who had figured in local events but never previously taken part in an international speed contest. He proved himself a good driver, but rather weak on pit work.

After a couple of laps Jean Chassagne proved that he was the fastest of the Frenchmen. He handled his Ballot in a wonderfully clever manner, and after trailing Murphy and Boyer for six laps he got ahead of the Detroiter in the seventh and took the lead on the twelfth lap after Murphy had stopped for two rear tires and gas. The Frenchman held the leading position for the next six laps, but could not shake off either Murphy or Boyer and began to be threatened by Albert Guyot, who, after an indifferent start, began to climb rapidly.

Albert Guyot, left, who drove a Duesenberg in the French Grand Prix. Georges Carpentier was there with his winsome smile.

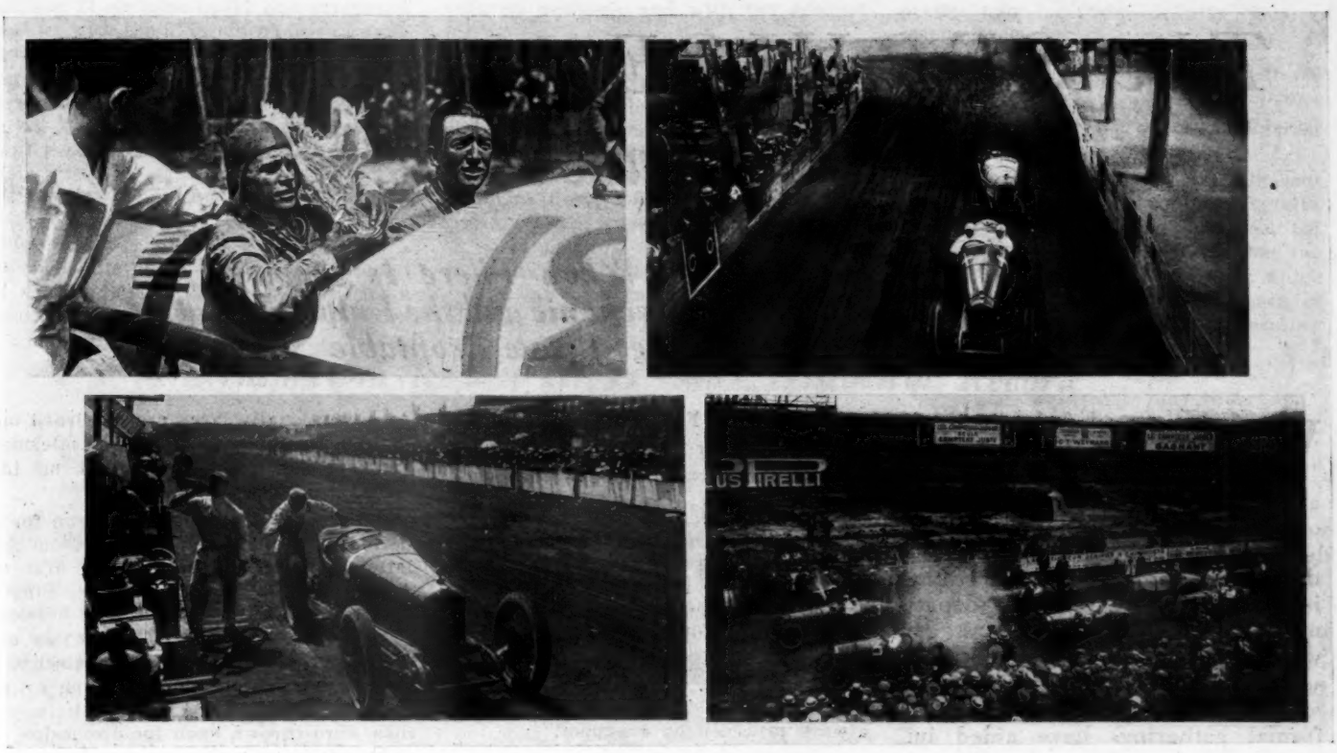
The height of excitement was reached at this point, for it was evident that all the French hopes rested on Chassagne. De Palma had never been able to get better than fourth, Goux was handicapped by having a car with a piston displacement of only 122 cu. in., and Wagner had a lot of time to make up by reason of his clutch trouble at the start.

While Boyer and Murphy were chasing Chassagne hard, the difference between the blue French and the white American cars always being less than a minute, Chassagne pulled into the pits with gasoline streaming from his tank. It was given out that a flying stone—the course was thickly strewn with them—had gone through the tank. The real cause was the opening of the real axle when the Ballot skidded on one of the turns in an effort to avoid Dubonnet's Duesenberg. The fractured axle struck the gas tank. This accident was similar to the one which befell Thomas when driving in the Targa Florio race.

MURPHY DISREGARDS "GO SLOW" ORDERS

With Chassagne out, Jimmie Murphy had the race in his hands, and was never headed until he crossed the line a winner. His victory seemed so sure that George H. Robertson, who was managing the team, hung out the "go slow" sign, which Murphy admitted afterwards he had ignored.

For ten consecutive laps, or until the end of the 27th, the position was Murphy first, Guyot second, with De Palma on the Ballot running third. On the 28th lap Guyot had to stop to change tires and dropped into third place, De Palma going into second place a little more than 18 minutes behind Murphy's Duesenberg. The mechanician, who had worked hard changing tires, who had been hit on the head by flying stones, and had had all the skin taken off his nose by burning rubber, was unable to crank the engine. Arthur Duray, watching the race as a spectator, vaulted the railings, hatless, and in black clothes, and took the place of the exhausted man. Two laps were made in this way, but the clutch trouble pulled Guyot down from second to sixth place in these 21 miles. These incidents made De Palma sure of second place, and enabled Goux, with his 122



Interesting Views of the French Grand Prix Race

Upper left—Flowers for the winner—the drivers ate dirt, as attested by the mask of it on Murphy's face. Upper right—Murphy on De Palma's trail at Frontliene turn. Lower left—a drink for De Palma. Lower right—Ralph De Palma about to get starter's flag

cu. in. four-cylinder Ballot to work into third place. Dubonnet got fourth.

The race was started at one minute intervals, and in pairs. There were only thirteen competitors, but as the course measured 10.7 miles round, there never was a dull moment at the grandstands. Tires played an important role, but did not falsify the results.

The Italian Pirelli Co. had brought out a new straight side cord tire of 35 by 5, which was supplied exclusively to the Ballot team. This proved to be an excellent tire for these conditions, for when Chassagne went out after 17 laps his tires were in first class condition, and Ralph De Palma covered the entire distance without making a change. The American driver imitated the Duesenberg team by going away without a spare wheel. The Frenchmen refused to do this. Experiment had shown that it was quicker to drive on the rim, even if the burst took place just after the pits, than to change on the roadside and then stop again to pick up a spare wheel. This was the first time cars had raced in France without carrying a spare wheel.

STRAIGHT SIDE TIRES MAKE SHOWING

This race had done more to help the straight side than a year's ordinary newspaper propaganda. The French motoring public attaches an immense amount of importance to the lessons learned in racing, and the theorist who now comes forth to prove the detrimental influence of circumferential weight is likely to receive scant attention. There are no signs that anybody is preparing to profit by this demonstration, but the fact remains that this race has made the way easier for the introduction of the straight side tire by dissipating many of the prejudices which existed against it.

AMERICAN CARS LIGHTER THAN EUROPEAN RIVALS

The French cars had decidedly better tires for this class of road, and were handicapped over such a comparatively short distance as 322 miles. Had the test been for 500 miles the better European tires might have decided the race in favor of the Ballots.

A very favorable impression was created by the low weight of the Duesenberg cars, compared with the European machines, and the conclusion was drawn that American metallurgists have got ahead of their European rivals.

Ignition honors were equally divided. Delco equipped Duesenberg, Talbot and Darracq, and the Swiss Scintilla magneto was used on the Ballot cars. There was no ignition troubles, and plugs, which were K. L. G.'s for the Europeans and A. C.'s for the Americans, were equally satisfactory.

After arrival in France three of the Duesenberg cars were equipped with the French Claudel carbureter. Murphy decided to retain his Miller, which he had got into first class condition, for although the Claudel seemed to be rather better on acceleration, he was not disposed to take the risk of a road accident during a final test on the day before the race. The trouble with the Claudels was sticking throttle barrels, occasioned by road dust. Chassagne foresaw this and fitted a very heavy recall spring. Wagner and De Palma had to fit extra springs during the race. This was not the fault of the drivers so much as of the firm, for Ballot did not encourage suggestions from his drivers, and Chassagne was in a position to get work done which could not be attempted by the others.

SEIZE DUESENBERG CARS FOR INFRINGEMENT OF PATENT

Paris, July 28—Claiming an infringement of their patents on hydraulic four wheel brake systems, the Rolland-Pilain Co., of Tours, made a descriptive seizure of one of the Duesenberg cars at Le Mans today. This action was taken, declared the Rolland-Pilain Co., in order to protect their legal rights in this system of braking. The seizure was merely of a technical character and does not tie up the cars or interfere with any of the arrangements made for shipping them back to America. Rolland-Pilain exhibited a hydraulic braking system at the Paris show in 1910, and although never having been in production intends to put his brakes on the market next year. The Duesenberg brakes are built under license obtained from an American company.

The SERVICE MANAGER Speaks:

Best Service Is Rendered When There Is Spirit of Cooperation Between the Mechanic and the Employer—Get-together Meetings Prove Profitable

By J. F. McDONALD,
Mgr. of Service for Ohio-Buick Co., of Cleveland

WE believe whole-heartedly in frequent informal meetings of our service employees, and feel that a great amount of good results from them, for both the individual employee and the company. Too often there is a great gap between department heads and employees, a gap which can be bridged only by personal contact away from the job. Our experience has shown that our informal gatherings have aided immeasurably in welding the different individuals and different departments into one united body.

We have get-together meetings, which are attended by all the employees of the Ohio-Buick organization. They are held at intervals throughout the year; a banquet is served, and outside speakers are secured to address the gathering. These meetings are entirly informal, all employees being included from managers down to office boys. The president, vice president, treasurer and other officers rub elbows with the employees. All business cares are forgotten, and everyone is out to have a good time. A dance generally closes the evening's enjoyment.

ANNUAL PICNIC PROMOTES HARMONY

We might also mention the yearly pilgrimage to the first circus which arrives in town, when everybody turns out en masse, and sits together as guests of the company in a specially reserved section of the grandstand.

There is also the annual picnic during the summer, a real joy-time for every one. In the morning a ball game is held between the service and sales departments, and after a big picnic dinner, the afternoon is given over to games.

These are but special "treats" that are provided for the employees. A daily "treat" which is thoroughly appreciated by all is the company cafeteria. It is here again that the spirit of cameraderie prevails. Officers, managers and employees all sit at the same tables, and enjoy the respite from the day's work together. A good substantial meal is served at cost by a cook who is past master at the art of satisfactorily filling the big hungry void of the mechanic as well as catering to the more dainty taste of the office girl.

In the service department, this idea of frequent meetings which bring the personnel together has produced beneficial results. Every two weeks a service meeting is held, presided over by the service manager, and attended by the wholesale and retail assistant service managers, manager of accounting department, and shop superintendents. The meetings are held in the evening, and are always preceded by a supper.

SERVICE DEPARTMENT MEETS EVERY TWO WEEKS

At those service meetings all inter-service department problems are discussed and service policies formulated. Any matters from previous meetings which are to be discussed are brought up by the chairman. After these matters have been disposed of, each man, in turn, is given the opportunity to bring before the meeting any matters he desires.

They may be suggestions for improvement of systems or methods, criticisms of other branches of the service department, or of other departments of the Ohio-Buick organization; in short, anything whatever pertaining to Ohio-Buick service. These matters are discussed as brought up and thoroughly thrashed out to the satisfaction of everyone. In the case of things concerning other departments, the service manager, of course, takes them up with the heads of the other departments. A definite ruling is obtained and reported at the next service meeting.

KEEPING THE SERVICE DIVISION INFORMED

Any service department in order to be efficient, and keep the product of the company sold, must be "up on its toes" every minute, keeping in touch daily with all that is new in the mechanical world, and learning new methods of repair and correlating them with the old. In order that all Ohio-Buick mechanics may have a very thorough and practical knowledge of motor mechanics in general and Buick operation in particular, a mechanical school has been held during the winter months for the last five years, meetings being held every two weeks.

In order to impress the men with the value of a mechanical school, a personal letter was sent to all by the service manager, and brought splendid results. An exceptionally large crowd turned out for opening night, including salesmen and office employees, as well as the mechanics.

This mechanical school was run for a period of about seven months, from the latter part of October to the first of April. As in preceding years, supper was served before each school session. At each session certain topics, as arranged in the schedule, were discussed by one of the shop superintendents. At the conclusion of the lecture, the meetings were thrown open for discussion of any matters on which the men had questions. These discussions proved to be quite a feature, and resulted in the clearing up of many points on which there was some doubt.

The schedule, as arranged by the committee, was very complete, and dealt with the different parts of the car. In several cases, however, it was found that the assignment for the evening was more than could be covered. It was therefore necessary to hold several extra sessions in order to keep up with the schedule.

MANUFACTURERS SEND REPRESENTATIVES

In the case of certain products, such as the batteries and carbureters, we were fortunate in having the manufacturers send a representative who addressed us on his particular product, and answered any questions on same.

Examinations were held every third session, with a final examination on the last night. From the start a hot battle developed among the men attending the school to win the first prize, which consisted of a Kennedy steel tool kit with an assortment of about 50 tools, such as wrenches, pliers, bearing scrapers, drifts, hammers, files, chisels, alcohol torch, soldering iron and hacksaw. The second prize consisted of a Kennedy wood tool kit, containing about ten drawers for tools.

AUTOMOTIVE LIBRARY FOR EMPLOYEES

A letter of recommendation was sent by the service manager to those contestants who held the three highest averages, praising them for their conscientious endeavor and urging them on to further application and study.

A library is also conducted by the service department for the use of its em-

ployees. It contains books and pamphlets dealing with the different phases of automobile design and repair. In it are also kept the files of current trade journals. New volumes are constantly being added in an endeavor to keep the library as nearly complete and up-to-date as possible.

Periodically a complete list of the books in the library is posted on the different shop bulletin boards, while a special bulletin is issued upon receipt of each volume. The length of time a man is allowed to keep a book varies with its newness, and with the demand for it.

There is still another method by which the service manager keeps in touch with the members of the service department, and that is through "The U & I of Buick," the monthly Ohio-Buick magazine, which is sent to all employees of all Buick dealers in the Ohio-Buick territory. Each issue contains an article on some phase of service written by the manager.

It is an accepted principle that the ultimate strength of any organization depends upon certain definite factors, among them being:

1. *The intelligence and initiative of the individual members of the organization.*

2. *The cooperation between the different departments.*

There unquestionably may be different ways in which to secure these results, but we, in the service department of Ohio-Buick are fully convinced that the frequent meetings of various sorts, which we have been describing, have been of untold value in achieving those results.

Inspection Report Gives Car's Historical Record

HOW many dealers know just what it costs them to deliver a new car and give the customary gratis service in connection with the delivery?

How many know, when a customer reports his car not running properly, whether it is the fault of the customer, the factory or the dealer?

How many, in seeking adjustments with the factory, are able to show just what it cost them to keep a certain car going and the customer satisfied?

Dealers everywhere have been subject to annoyance and expense from these sources ever since the first automobile was made. Jesse Silverman, of the Syracuse Motor Car Co., Syracuse, N. Y., evolved a plan whereby such annoyances are reduced to a minimum.

The Syracuse Motor Car Co. handles Paige, Chalmers and Maxwell cars for a large portion of New York state, and the cost of delivery and service is a large item. It was no part of the plan of doing business to cease giving service to customers, so Mr. Silverman set about to contrive a means of reducing the expense where it could be properly done.

The result was two cards—one a car record and the other an inspection report—which, placed on file, provide the company with a complete and authentic record of every car received, its condition, the service given on it, credit claims and allowances—in fact, a full statement of every item of expense attached to every car delivered by the company available on a moment's notice.

When a car is received from the factory, a blank inspection report is attached to it and the service force turned loose on the machine. The card is so arranged that several inspectors can work on the car at the same time and make the record without interfering with one another. When the inspection gang is through, nothing has been left to guesswork; every part of the car has been examined, every possible source of trouble looked to, and the result of the examination entered in its proper place on the card.

The customer's name and address are entered, the time required for inspection and the amount of material used, and the card is signed by the inspector and dated.

Then the car record card is made out with the purchaser's name and address, description of the car, date it was received, whether by railroad or driven, the date of delivery and the expiration of the guarantee. The card contains space for the entry of every job done on it during the period of the guarantee, the amount of labor and material used, whether it is charged or given gratis, the amount of credit claim, and the credit allowed, with the net cost to the company.

The new system has been in use only a short time, but is working out well.

INSPECTION REPORT.

Name Customer's Name — Make of Car Paige
Address Customers Address — Model 6-66
Car Number 121039

MOTOR
Tappet Clearances .005
Is motor tight in frame? yes

OILING SYSTEM
Condition of Oil new
Oil Level Full

IGNITION
Timing O.K.
Timer gaps Range
Spark plug gaps .025
Governor free yes

STARTING MOTOR
Tight on base yes
Turns engine slowly
Lubricated yes

GENERATOR
Lubricated yes
Brushes squeak no
Maximum amperes 15
In line yes
Cuts in 8 M.H.P.

FUEL SUPPLY
Gallons in tank 5
Quarts oil in tank 6
Carburetor adjusted yes
Carburetor choke adjusted yes
Vacuum tank O.K.
Gasoline gauge OK

COOLING SYSTEM
Radiator
Water level Full
Pressometer reading —
Pump grease cups turned yes
Fan bearing lubricated yes
Water leaks None

CLUTCH
Grabs No Slips no
Floor board clearance ¾"
Does clutch pedal wobble no
Throw-out lubricated yes
Oil level —

TRANSMISSION
Oil level Full
Quiet yes
Lock OK

DIFFERENTIAL
Oil level Full
Quiet yes

REAR AXLE
Service brake
Equalize yes
Free yes
Returns OK
Bands conformed yes
Bands cooked no
Hand brake
Equalize yes
Free yes
Returns yes
Wheels tight yes
Cotter pins in place yes

STEERING GEAR AND FRONT AXLE
Lost motion ¼"
Steers Fair
Hub caps packed yes
Cotter pins in place yes
Wheel bearings adjusted yes
Toe in yes
Cotter pins and lock washers in reach rod jam nut yes

SPRINGS
Clips tight yes
Shackles tight no
Oil holes located On top

UNIVERSALS
Tight yes
Lubricated yes

CHASSIS
Clevises lubricated yes
Throttle and spark levers free? yes
Grease cups filled yes
Oil cups filled yes
Fender bolts tight yes
Hood clips lubricated yes
Chassis wiring yes

BATTERY
Tight on frame yes
Water level ½" above plates
Gravity 1250
Terminals OK + greased
Dating June 1921

LIGHTS
Head OK
Dim OK
Rear OK
Dash OK
Tonneau OK

Foot OK
Dome OK
Corner OK
Side OK
Fuses OK

TIRES
Pressure 75 lbs.
Rim bolts tight yes
Rims lined up yes

BODY
Dents None
Clean yes
Bolts tight yes
Rattles and squeaks none
Doors open and close yes
Door locks operate yes
Sliding seats lock and slide yes
Cabinet locks operate yes
Ventilator closes and opens yes
Rear deck locks and opens yes
Window raisers OK
Window curtains OK
Windshield tight yes
Cushions in place and clean yes
Condition of upholstery Perfect
Weather strip in place yes
Floor mats in place and clean yes
Side curtains in place yes
Top back straps tight yes

KEYS
Transmission R. door Pocket
Door Tool in door
Cabinet R. door Pocket
Rear deck Tool Kit
Switch Tool Kit

ACCESSORIES
Tire pump OK
Exhaust heater closes and opens yes
Clock runs and sets yes
Vanity case on floor
Cigar lighter on brake
Ammeter indicates yes
Curtain rods OK
Speedometer
Miles indicated 45
Quiet yes
Tool kit OK
Top hood Tan Fabrikoid

MISCELLANEOUS

Time 4 hrs — Inspected by A. M. Page
Material 5 gals gas 6 qts Oil — Date July 11, 1921

From the record sheet shown above it will be noted that there is hardly an item on the car which has not been checked

INTAKE MANIFOLDING

Multi-cylinder Manifolding as Applied to Six-Cylinder Engines. Firing Orders Must Be Considered in Redesigning Old Induction Systems

INTAKE manifolds for six-cylinder engines present further complications in design, one of the principal factors of which is that of engine firing orders.

Obviously a manifold which is correct for a firing order of 1-3-5-6-4-2 or 1-4-2-6-3-5 will not give good results if applied to an engine with a firing order of 1-5-3-6-2-4 or 1-2-4-6-5-3, for the reasons outlined in previous articles of this series.

Of the two methods of arranging the crankthrows shown in Fig. 1 that to the left was used in about 30 per cent of American cars. The method shown to the right was used in about 70 per cent. Of firing orders, 1-3-5-6-4-2 and 1-5-3-6-2-4 have the preference in about the same proportions. Therefore, the advisability of determining an engine's firing order before attempting to lay out a new manifold is apparent. Not only must the length of tubing and number and radius of bends be taken into consideration but also the order in which the cylinders follow each other in aspiration. This last is where the firing order enters into the calculations.

A reference to the previous articles of this series will disclose why this is so. For instance, it has been shown why a manifold suitable for a twin cylinder engine with a 360 deg. crank setting is woefully inefficient when used on one with a 180 deg. crank arrangement. It is principally a matter of control of condensation.

The use of two carbureters, one to each group of three cylinders, or of double carbureters having a single float chamber is becoming common in Europe and it is to be expected that the practice will be adopted in this country when the costs of the improved installations have been brought down to somewhere near those of the present conventional types. At present the necessary expenditure is prohibitive.

Previous Articles

SINGLE, two-cylinder and four-cylinder manifolds have been analyzed in the two previous articles of this series. The present one will deal with the subject from the angle of the six-cylinder engine.

As in the four-cylinder engines the use of long, exposed pipes, such as are shown in Figs. 2, 3 and 4, is to be condemned, as no matter what expedients are resorted to, the quality of the mixture distributed to each of the cylinders cannot be controlled as excessive condensation is certain to upset carbureter adjustment. The same objection applies to the system shown in Fig. 5, though strange as it may seem, not to so great an extent to that shown in Fig. 6 for the same reason that the single transverse pipe is preferable to two branches as is the case when comparing similar systems used on four cylinder engines.

However, be it understood that the arrangement shown in Fig. 6 is efficient with a firing order of 1-5-3-6-2-4 only, as the surging of the gas tends to prevent condensation and, of course, to keep it well mixed. For firing orders of 1-3-5-6-4-2 the arrangement shown in Figs. 7 and 8 are satisfactory for the reason that they give practically the same length of path for cylinders 2, 3, 4 and 5. True, cylinders 1 and 6 seem to be handicapped by an excessive length of pipe. But, this is compensated for by the fact that they are immediately followed by their neighboring cylinders, 4 and 5, which prevents a change in the direction of the gas travel.

The use of single carbureters makes the use of one of the two forms imperative with the firing order mentioned. Fig. 9 is faulty in the extreme and, wherever found, should be supplanted by a more efficient form.

When two carbureters, or one double one with a common float chamber, are employed, manifolding is simplified and the form shown in Fig. 10 gives excellent results. This form is used on the Hispano-Suiza engine, the principal difference between the actual installation and the layout shown being that the former

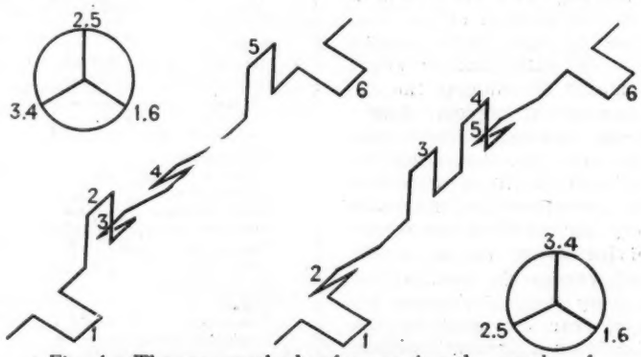


Fig. 1—The two methods of arranging the cranks of six-cylinder shafts. That to the left gives firing orders of 1-3-5-6-4-2 and 1-4-2-6-3-5, while that to the right gives orders of 1-5-3-6-2-4 and 1-2-4-6-5-3

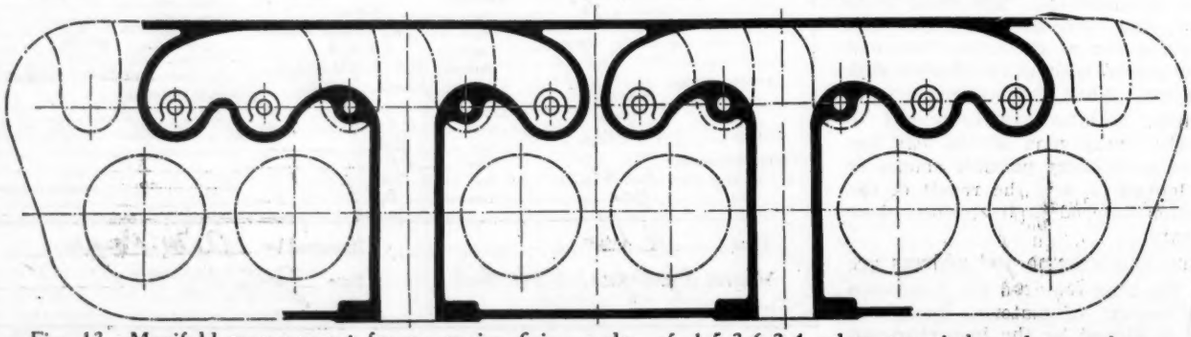


Fig. 13—Manifold arrangement for an engine firing order of 1-5-3-6-2-4 when two independent carbureters or a double carbureter with two mixing chambers and one float are used

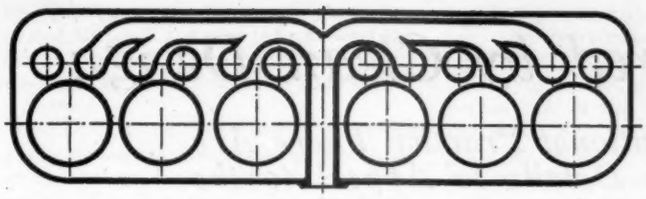


Fig. 11—This form of manifold is giving excellent results on engines with a 1-4-2-6-3-5 firing order

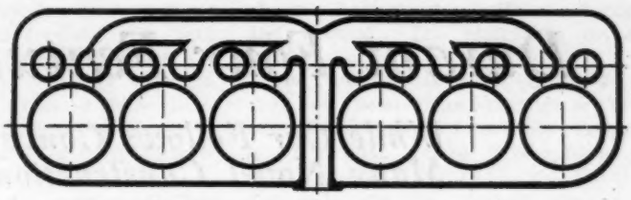


Fig. 12—Small engines with manifolds of small cross sections are performing satisfactorily with this and the manifold layout shown at the left

employs a double carbureter instead of two independent ones. With internal manifolds it is difficult to determine just what takes place inside the passages and just how the gas flows to the proper cylinders and surges first one way and then the other.

It is highly probable that the gas flow differs greatly with engine temperatures so that observations of air currents through the passages while they are cold form no reliable index of their behavior after the parts have reached a normal working heat.

Although much of this part of the subject is not well understood it is definitely known that the manifolds shown in Figs. 11 and 12 give excellent results when the firing orders are 1-4-2-6-3-5 and 1-5-3-6-4-2 respectively. These layouts have proven particularly effective when used on small engines with pipes of small section. So perfect is the operation that it has been impossible to detect any material difference in the quality of mixture delivered to the various cylinders.

The application of two carbureters to engines with a firing order of 1-5-3-6-2-4 necessitates a change in manifolding from the form shown in Fig. 12 to that shown in Fig. 13. While, as before mentioned, this form has proven its worth in Europe, it is quite likely that it will not become general practice in this country for some time to come on account of its greater manufacturing cost.

However, there are thousands of motorists who would willingly pay for two carbureters and the cost of making the change if they could be assured that a bettering of engine performance and economy would result. And as this seems to be conclusively proven by the experience of the European engine builders, it will not be surprising if the better informed American motorists, realizing that something can be done to improve a bad condition, take matters into their own hands and order the change made on their cars after they purchase them.

Should this come to pass, the service mechanic who is equipped to offer intelligent advice and explain to his customers the intricacies of gas, distribution and travel is going to stand an excellent chance of doing a good business changing old, faulty six-cylinder exterior manifolds to the forms which it has been proven are doing much to eliminate condensation and its attendant evils of fuel waste and the excessive dilution of crankcase oil.

Next week's article of this series will deal with eight-cylinder engine manifolding with a few observations on condensation as shown in a glass manifold.

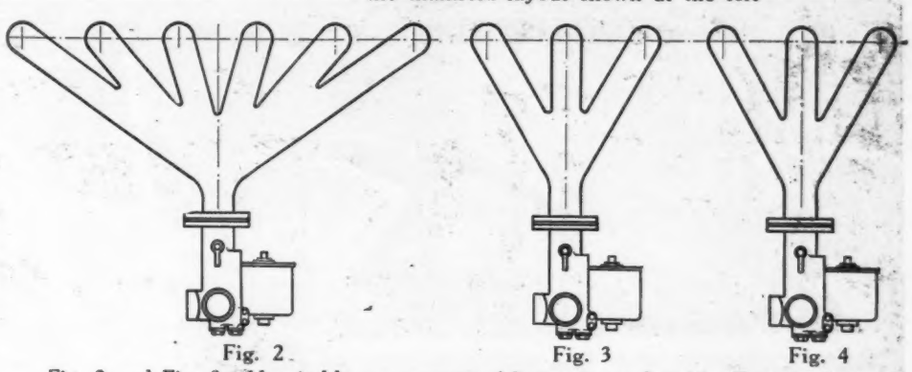


Fig. 2 Fig. 3 Fig. 4

Fig. 2 and Fig. 3—Unsuitable on account of large exposed area. Fig. 4—Some improvements over Fig. 2, but still far from perfect

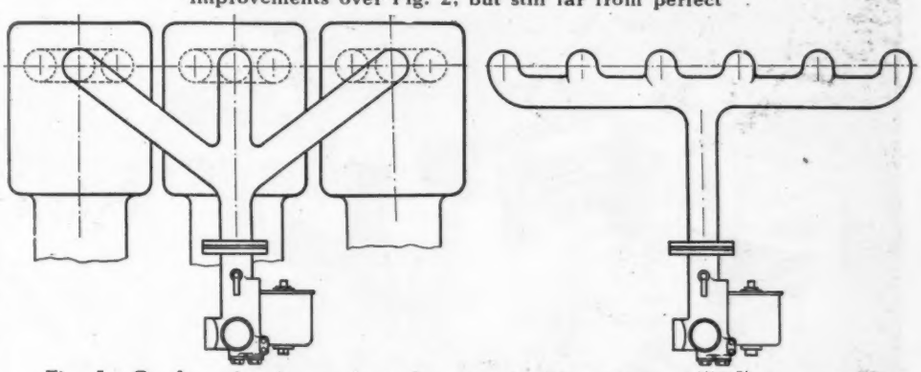


Fig. 5—Condensation is certain to be great in this system. In Fig. 6, condensation is minimized by the surging of the gas in the horizontal branch

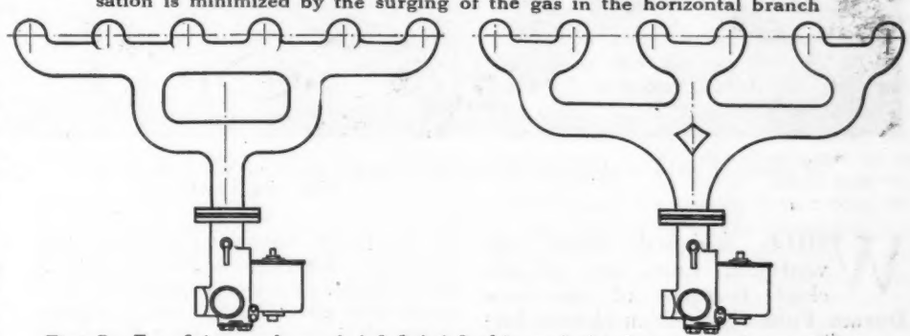


Fig. 7—For firing orders of 1-3-5-6-4-2 this and the layout to the right are satisfactory; in Fig. 8, surging effects compensate for the apparent starving of the first and sixth cylinders

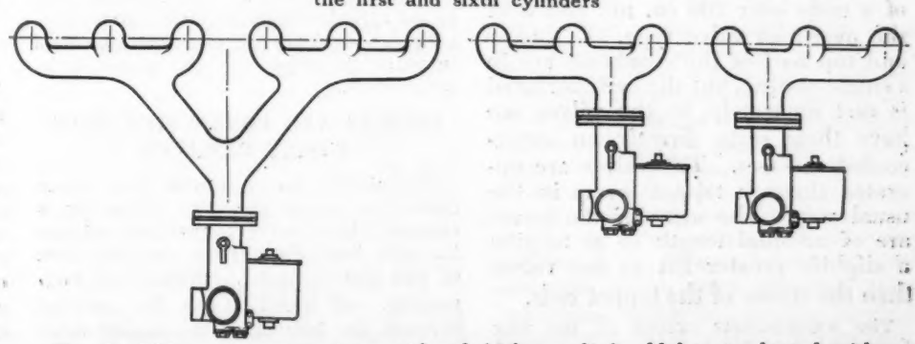
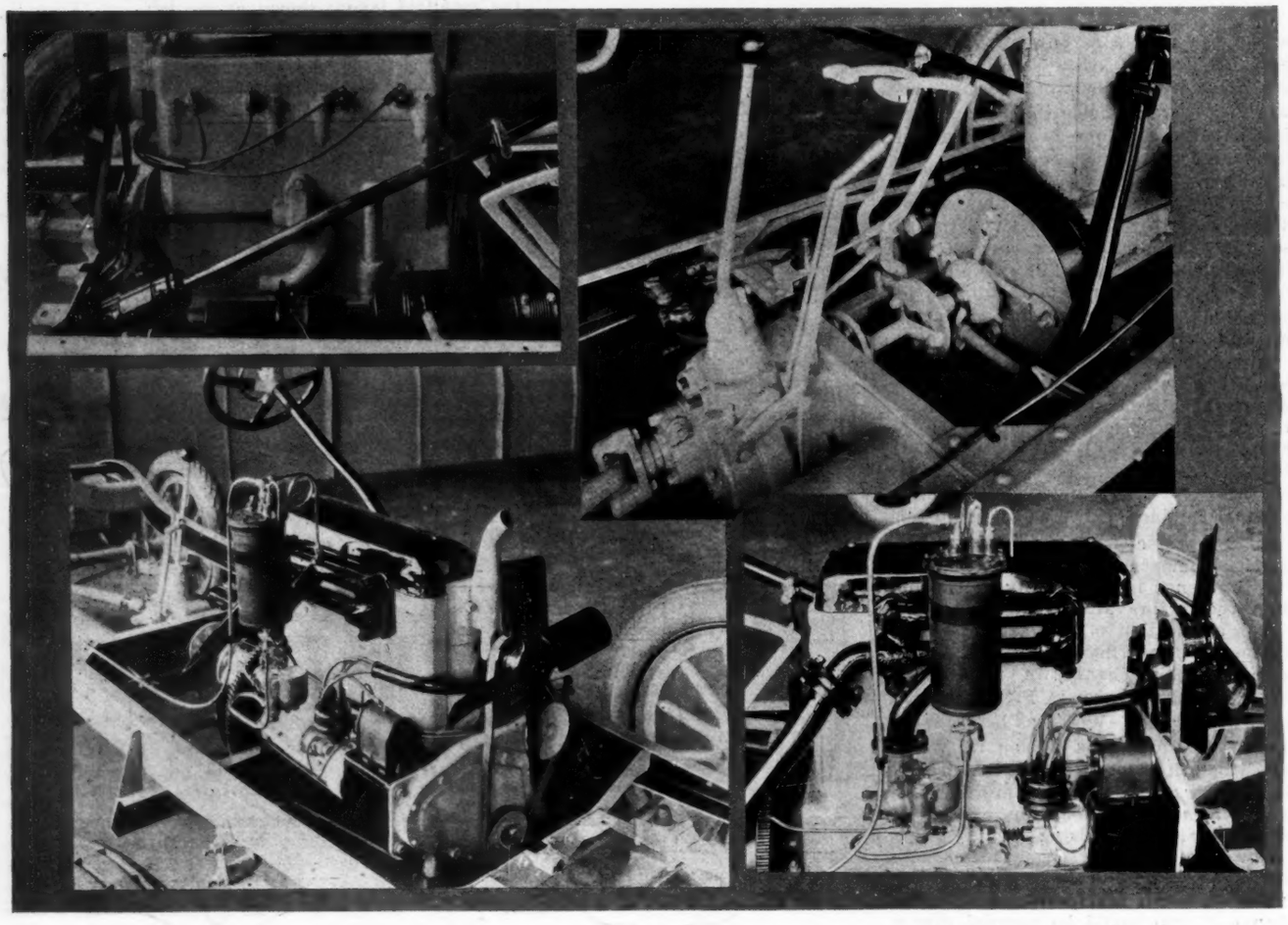


Fig. 9—This arrangement is considered faulty and should be supplanted with one of those shown in Figs. 7 and 8, and Fig. 10, another view of the layout

Durant Four Featured by Clean Design

While Car Follows Conventional Practice There Are Many Novel Construction Details to Appeal to the Service Man



A series of pictures showing details of the power plant of the Durant Four. It will readily be noticed how accessible the units are

WHILE designed along conventional lines, one of the chief features of the new Durant Four is its clean chassis layout. The engine, with cylinders 3⅞ by 4¼ in., has a piston displacement of a trifle over 200 cu. in., and is of the overhead valve type. Cylinders and top half of the crankcase are in a single casting, but the cylinder head is cast separately, so the valves can have their seats directly on water-cooled surfaces. The valves are operated through tappet levers in the usual way. The arms of the levers are of unequal length so as to give a slightly greater lift to the valves than the stroke of the tappet rods.

The waterjackets extend all the way down the cylinder barrels and there is no offset in the casting at the lower end of the piston stroke. The tappet rods extending down the righthand side of the cylinder block are enclosed by a sheetmetal cover, and there is another cover of pressed steel over the tappet levers and other mechanism on top of the engine. The cylinder head is held to the cylinder block by eight cap screws, of which the four on one side also hold in place the caps over the tappet lever pivot shaft.

PISTONS AND CONNECTING RODS EASILY REMOVED

The pistons are iron with three rings above the piston pin. The piston pin is clamped tight in the connecting rod and its ends bear directly on the cast iron of the piston bosses. Piston and connecting rod together can be removed through the bottom of the engine after the oil pan is taken off. The crankshaft has three main bearings.

Fuel is carried in a 13.5 gal. tank mounted at the rear of the frame, from which it is fed to the carbureter by a Stewart vacuum feed tank. The make of the carbureter has not been finally decided upon, the car from which these notes were taken being fitted with a Tillotson. A rather novel combination inlet and exhaust manifold is used.

The electrical equipment is of Auto-Lite make. The starter is located on the lefthand side and drives to a gear ring cut on the flywheel through an inboard Bendix drive. It may here be pointed out that the gearcase is a separate unit and the flywheel, starter and drive are uncovered, so that both the starter and its driving mechanism are in plain view on the chassis and very accessible. The generator is mounted on the opposite side of the engine, forward, and is driven from the camshaft through enclosed gearing. The high tension cables from

the distributer to the spark plugs are carried through a metal tube around the forward end of the cylinder block. All other wiring is encased in flexible metallic tubing.

Lubrication is by the circulating splash system, a gear type of pump being carried on the outside of the crankcase on the righthand side and driven from the generator through a flexible coupling. Oil is fed to the main crankshaft and to the camshaft bearings directly, and a pressure gage is mounted on the instrument board. Oil is also delivered into each of the four splash troughs and into the cam gear housing, and splash within the case provides lubricant to all the other bearing surfaces. The oil pump draws its oil from a large strainer at the lowest part of the oil pan.

DRIVEN BY VEE BELT FROM FORWARD END

Cooling is by pump circulation. A centrifugal type of pump is mounted on the righthand side and is driven by a Vee belt from the forward end of the crankshaft. The same belt drives the four-bladed radiator fan, the drive being a triangular one, with one side substantially vertical. There is one peculiarity to the water pump and that is that its impeller is located partly within the engine water jacket and its housing is of substantially semi-cylindrical form. This brings the pump driveshaft very close to the cylinder block and ensures free circulation of the water by thermosiphon action in case of failure of the pump or its drive.

As a means for adjusting the tension of the drive belt, the base of the fan bracket is provided with elongated holes by which it is bolted to the cylinder block. The hub of the fan contains an oil reservoir from which its bearings are lubricated.

The muffler, which is located just inside the righthand frame side bar, between a cross member directly in front of the gearset and another substantially over the rear axle, serves the additional purpose of stiffening the frame against weaving.

The frame is made up of 4½ in. channel sections with few cross members, of which two at least are quite flat so that as a whole it is very flexible. The muffler, however, being a long tube of about 6 in. diameter with relatively heavy walls and securely fastened to the cross members by means of flanges at both ends, adds greatly to the stiffness of the frame.

The muffling elements are of the simplest possible nature. The exhaust pipe enters the muffler centrally at one end and is carried part way through it. Its end is closed up but that part of the pipe within the muffler is perforated and the exhaust gas escapes through these perforations into the muffler, from which it passes to the atmosphere through an opening on the lower side of the rear end formed by a bulge in the head.

The clutch is built together with the flywheel and is of the single plate type. The steel driven plate is slotted radially so as to prevent distortion through heating, and consequent trouble. On both sides of the steel driven disk there are eleven ½ in. floating disks of wire asbestos and on the outside of these floating disks are the flywheel web and a plate which is in direct driving connecton with the flywheel.

The various disks are pressed together by a series of coiled springs located near the periphery, while the disengaging pressure is transmitted through a series of four levers, which, instead of being arranged radially to the clutch axis, are offset from that axis to such an extent that they pass the clutch shaft, which permits of a greater multiplication of the pressure. Except for the disengaging pressure multiplying levers, the clutch is completely enclosed. There is a large oil chamber in the shifting collar, and lubrication of the clutch needs to be attended to only once a year.

Durant Specifications

Price—Touring Car, $890.
Wheelbase—109 in.
Engine—4 cylinders, 3⅞x4¼ in.
Carbureter—Tillotson.
Fuel Feed—Stewart.
Starting and Lighting—Auto-Lite.
Clutch—Single plate.
Gearset—Warner 3 speed.
Universals—Thermoid and Peters.
Rear Axle—Adams with Timken bearings.
Weight—2250 lbs.
Tires—31x4 Goodyear.
Chassis Lubrication—Alemite.

Between the clutch and the gearset there is a short intermediate shaft with two fabric universal joints, the spiders of which have only two arms each. The gearset is supported on a cross member of the frame. It is of the ordinary three-speed and reverse, selecting sliding type and is fitted with annular ball bearings on its primary shaft. The shifting lever is of the ball-mounted, ball-handled type and is centrally located. Gear positions are arranged in accordance with S. A. E. recommended practice. The emergency brake lever is mounted on the right side of the gearbox and operates on a toothhead sector as usual. Cast iron is the material of the gearcase.

Between the gearset and the rear axle is inserted the solid propeller shaft with two metal type universal joints. The final drive is by spiral bevel gears and gives a reduction ratio of 4 1/3 to 1. The rear axle is of the builtup, semi-floating type.

The frame, as already mentioned, consists of 4½ in. channel bars, and these are straight from end to end in the vertical plane, but are set considerably farther apart at the rear than at the front. It is supported by half-elliptic springs all around, the rear springs being 48 in. long and the front springs 34, and both sets 2 in. wide. The rear springs are underslung. The Alemite lubricating system is used for the whole of the chassis. All shackle bolts are hardened and ground. The Hotchkiss drive is used.

The front axle is of the regular I-beam type, but the steering knuckles are of the inverted Elliot type found more frequently in higher priced cars. Stops are forged on the knuckles to limit the steering deflection and prevent contact between the tires and parts of the chassis. Two Timken roller bearings are fitted in each front wheel. A feature of apparently considerable importance from the driver's point of view is that each wheel hub is formed with an extension in which a central screw thread is tapped, so that by carrying along a bolt of quite moderate dimensions the driver always has a wheel puller with him.

STEERING GEAR OF WORM AND COMPLETE WHEEL TYPE

The steering gear is of the worm and complete wheel type and the post is strongly raked. The steering gear housing is located between the engine crankcase and the frame directly to the rear of the frame cross member supporting the front end of the engine. Back of the steering gear housing is located the vibrator type of electric horn and back of this the starter. Beneath these parts there is a sheet steel filler plate extending between the engine and the frame. These accessories all lie quite low, and the sides of the engine higher up are encumbered very little.

The steering wheel is 16 in. in diameter and has a walnut rim and an aluminum center. The inner ends of the spokes show as aluminum and the outer ends as wood, giving a very attractive appearance. From the lower end of the steering post the connections to the carbureter and ignition unit are by flexible steel wires extending through tubes with their ends fixed, after the manner of Bowden wire controls.

Both sets of brakes act on drums on the rear wheels. The outside brakes are the service brakes and the inside the emergency. The brake drums are 12 in. in diameter; the inside bands are 1¾ in. wide and the outside 2 in. Each set is provided with means of adjustment adjacent to the drum which can be operated without the use of tools. The cross shaft for the brake linkage is located in front of the gearset, being supported by the same frame cross member which carries the transmission and storage battery.

The construction throughout is quite light and the five-passenger touring car, we are informed, weighs only 2,300 lbs. The bodies are upholstered in leather and the tops are made of a leather substitute and provided with a glass window in the back. Tire equipment is 34 by 4 in. Goodyear on wood wheels with steel felloes. A very rigid tire carrier is mounted at the rear of the body. The equipment includes drum shaped headlights with non-glare lenses; dash light, tail light and license holder on rear tire carrier; electric horn, speedometer, demountable rims with extra rim, ignition lock, Alemite pump and complete set of tools.

Equipping and Maintaining a Tire Repairshop

Three-Cavity Machine — *Separate Tube Plate Desirable*
Use of Reducing Shells — *Approximate Operating Cost*
Make It Easy to Expand

IT has been said that of the making of books there is no end, and the same can be said of the making of vulcanizing equipment. The quantity of such equipment required, and the style, will be governed entirely by the size of the shop and the volume of work turned out.

At the outset it is far better to under-estimate than to over-estimate. It is better to make too little equipment do the work than to attempt to keep too much equipment busy. Vulcanizing equipment is expensive and it is always necessary to remember that any piece of machinery must earn enough to pay interest on the investment, even if it pays no dividends for a while.

THE THREE-CAVITY MACHINE

There is only one best type of equipment for a shop that is just starting. That is the simple three-cavity vulcanizer with tube plate and inside repair-arm attached. The source of heat may be either natural or artificial gas or gasoline. Any of these is about as good as the other.

Such a machine will cure every style of tire from 3 in. section to 5 in. cord section with either clincher, QD, or straight side beads. Such machines invariably are supplied complete with all the necessary bead molds, clamps, etc.

There are a dozen different machines of this type on the market about equally good. It is important, however, to choose a machine that has a broad, firm foundation and that is provided with adequate means for solid attachment to the floor. The need for this will be discovered as soon as the first large tire sticks in the mold.

USE OF REDUCING SHELLS

Although such a machine has only one cavity that will cure a 3½-in. tire, it is possible to obtain what are termed reducing shells, which can be fitted into one of the larger cavities to reduce it in size to fit 3½-in. casings.

It is well to include a pair of such reducing shells in the equipment because work on 3½-in. tires very likely will constitute fully 40 per cent of all of the work turned out, because this is the size used most. It fits such small cars, for example, as the Ford, Maxwell, Overland, Chevrolet and several others.

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SEPARATE TUBE PLATE DESIRABLE

These three-cavity machines are almost invariably fitted with an integral tube plate. This means, of course, that the whole machine must be fired even though there is only one tube to be cured. For this reason it may be better to purchase the machine without tube plate and to install a separate tube plate that is complete in itself and has its own source of heat.

This would be particularly desirable where there is considerable volume of tube repairwork and not very much casing repairwork, for the expense of operating the separate tube plate would be far less than the cost of operating the entire machine.

APPROXIMATE OPERATING COST

In general, it will be found that the ordinary three-cavity machine operating on city illuminating gas will cost about $12 a month if operated continuously from 8 in the morning until 6 at night. This would figure out at the rate of about 48 cents a day, allowing 25 working days to the month.

This is the minimum cost of operating the machine continuously and can only be obtained with the aid of a properly-adjusted gas controller. These devices can be purchased on the open market and are of several types. They control the size of the gas flame under the vulcanizer through the medium of the steam pressure in the machine.

In other words, they maintain the pressure constant at 40, 45 or 50 lbs., according to the vulcanizing requirements. If the pressure drops below that for which the controller is set, the gas is automatically turned on until the pressure rises, when it is shut off. Such a controller eliminates all hand regulation and thus saves a large amount of time as well as money.

MAKE IT EASY TO EXPAND

Another advantage of the three-cavity self-contained vulcanizer is that there is no piping to be done. The machine is complete in itself and is ready to operate as soon as set up. With other types of equipment a certain amount of piping is necessary, and unless the size of the shop and volume of work are sufficient to warrant it, it is always best to avoid more extensive equipment.

The disadvantage of the ordinary three-cavity machine of the type described is that there is no possibility of enlarging its capacity beyond a certain well-defined limit. In other words, when its maximum capacity has been reached, the only alternative is to install another machine of its kind or else to scrap it and install other equipment which will allow necessary expansion.

If it were possible to look into the future and to forecast with any degree of accuracy the extent to which a business would grow, the best possible type of equipment to be installed would be separate and individual molds for each size of tire, all of them heated from a common boiler.

Equipment of this kind has the decided advantage that it can be added to from time to time with the utmost ease and at minimum expense. Thus, for example, if the volume of work on small tires in-

creases to the point where it cannot be handled with the present mold equipment it would be a simple matter to attach an additional mold of the proper size.

If it were decided to enter the field of truck tire repairing it would be quite as easy to add a 6, 7 or 8-in. mold to be used for such work.

The disadvantage of such equipment is the first expense of the molds and the boiler, the necessity for rather extensive piping, and the attention required by the boiler. In this respect it would be well to point out that the size of such boilers is regulated by law in some states and a certain maximum capacity prescribed for use where there is no licensed engineer. Larger boilers may require the attendance of a licensed engineer to care for them.

AIR BAGS AND STEAM BAGS

The process of vulcanizing is dependent upon the application of just the right degree of heat for the proper time in combination with pressure. The two accepted methods of applying the necessary pressure when curing casings in a cavity is to use either air bags or steam bags.

Air bags are far simpler to use than are steam bags, though they require a somewhat longer time for a perfect cure. When steam bags are used, steam is piped from the boiler direct to the bag and thus supplies both the necessary pressure and heat to the inside of the casing and thus completes the cure in a shorter time than when an air bag is used. Steam bags can be used for either steam or air, though the ordinary air bag can be used for air alone and cannot be attached to the steam line.

TWO SETS OF BAGS

The initial equipment should include a complete set of bags, either air or steam, to fit all sizes of casings, from 3-in. to 5-in. cord. It is desirable to have a duplicate set of bags. The object of this is to allow bags to cool thoroughly when they come out of a job before they are used again in another job. If given time to cool, their life is considerably lengthened.

Some manufacturers recommend that a small quantity of water be kept in air bags. Other makers advise against this practice. It is best to be governed by the recommendations of the maker of the equipment.

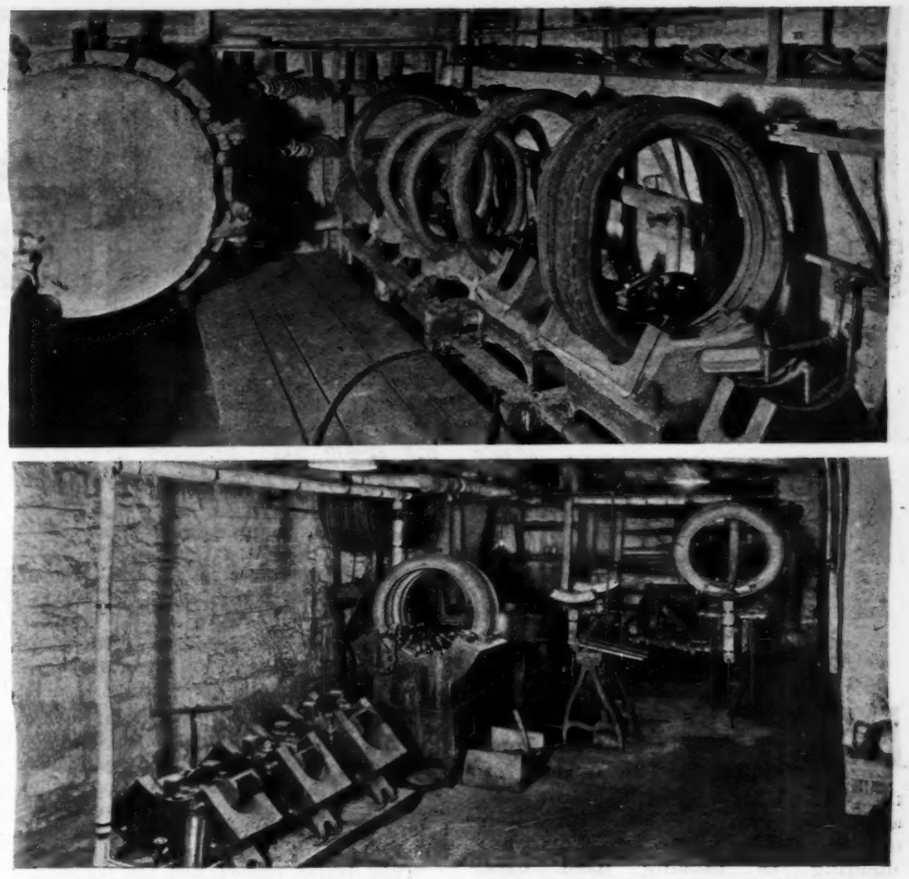
If steam bags are used it will be necessary to provide for passing the steam to them from the boiler and it is just as easy while this is being done to arrange the piping so that either air or steam can be used at will.

TUBE SPLICING EQUIPMENT

Occasionally tubes will come in for repair with a long rip, say 10 to 15 in. in length. There are two ways of repairing such a tube. The first is to cure the entire length of the rip, in sections if necessary, on the tube plate. The other method is to cut the ripped section out of the tube and splice in a new section from another old tube.

Because splices of this kind are difficult to make and are not always as satisfactory as they might be, due to the greater possibility of leaks developing, it is best to avoid splicing as much as possible.

Curing the entire length of the rip will make a far more satisfactory job and there will be less likelihood of trouble resulting; but if splicing must be done, it will be necessary to include in the equipment a set of splicing mandrels. This is inexpensive equipment and is found in very few vulcanizing shops. Nine times out of the proverbial ten such equipment is not needed; but when it is needed, it is indispensable; nothing can take its place.



Top—Perhaps the most satisfactory type of equipment for a shop just starting is the simple 3-cavity vulcanizer. Two of such machines are illustrated herewith, and to them has been added a number of single-cavity vulcanizers.

Bottom—Equipment of the separate mold variety has the decided advantage that it may be added to from time to time, with the minimum of expense and with the least time for installation. This illustration gives a very complete view of a shop located in a basement

DOUBLE END BUFFING STAND

Where quite a considerable volume of casing work is done, it will be desirable to have a power-driven buffing stand for preparing casings before they are built up.

Such a stand should have a double end spindle with either a rotary rasp or a coarse emery wheel on one end and a wire scratch brush on the other.

A rotary rasp has the advantage that it cuts far more quickly than does an emery wheel, but it is very difficult to use in the hands of an inexperienced workman, because of the danger of rasp tines catching in the fabric and ripping it. Though the emery wheel is slower, it obviates this danger, and often an inexperienced workman can turn out a good job after comparatively little practice.

If there is much buffing work to be done it will be necessary to have at least a 5-hp. motor to operate the buffing stand. If a smaller motor is used even moderate pressure on the emery wheel will stall it or throw the belts off, and it is impossible to attain any speed.

Furthermore, the 5-hp. motor permits both ends of the buffing stand to be used at the same time, one man buffing tires on the emery wheel and the other taking them from him and finishing them on the scratch brush at the same time. In a previous chapter will be found instructions regarding the proper size of belts to use and the method of determining pulley speeds, etc.

SMALL TOOLS THAT ARE NEEDED

We have covered practically all of the heavy equipment required in the shop just starting up. There still remains quite a quantity of smaller tools and appliances that in some cases are necessary and in others are merely desirable.

The bench must be equipped with

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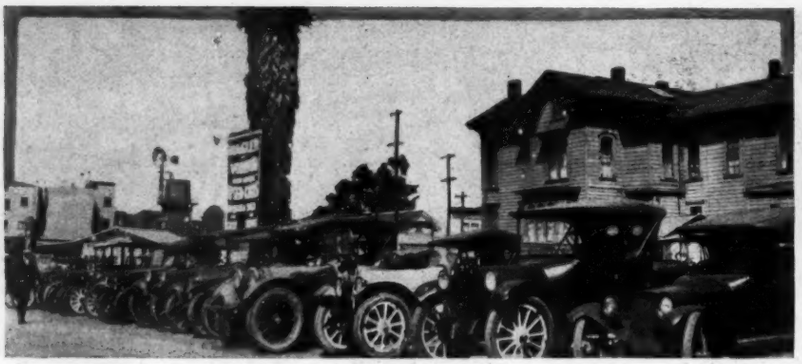

Cash for used cars or time payment plans are moving cars from these open air places in greater volume than from the salesrooms of dealers. The illustration on the right shows a curb market for used cars

Open Air Market for Used Cars

Idea Now Used in Several Pacific Coast Cities with Apparent Success. Some Dealers Are For and Some Against the Plan

IS the auctioneer coming into the automobile business? That is one of the questions the dealers of the Pacific Coast are beginning to ask, and, from the success with which open-air automobile markets are meeting in moving used cars, it would appear that the answer is, "Yes." Despite efforts made by the various trade associations and by a number of individual dealers, it has been found impossible to unite all the dealers—or even any appreciable number of them—on a cooperative plan of used-car selling in any of the cities of northern California. The principal obstacle to this movement has been variation in ideas of prices, and refusal of many of the dealers to have the prices on their used cars fixed by an appraiser, even though that appraiser be chosen by vote among the dealers.

In these days of price-cutting, some of the dealers are getting larger discounts than other dealers, and also larger than they ever did before, despite lowering prices, and these dealers are thus enabled by the manufacturer to allow more for a used car. Consequently, when they come to sell that used car, they have to get more out of it—or think they have to get more—than the dealer who took them in at a lower figure. As one San Francisco dealer said recently:

"Any plan to bring all the automobile dealers together in a cooperative used-car sale plan will have to go clear back to the manufacturer, for he is the person who is today causing such a great variation in the prices of used cars. The manufacturer of one car allows his dealer a greater discount than the manufacturer of another car, even in view of recent price reductions. As a result, the dealer with the greater discount is very apt to allow the prospect more for his used car than the dealer who has no such large discount is able to do. Thus the costs of his used cars slip up on the dealer with the big discount, sometimes before even he himself knows it, and he simply has got to 'get out from under.'

"This dealer cannot sell his renewed, rebuilt, or renovated cars at so low a price as the dealer who did business on a lower margin and neither will he agree to let an appraiser fix a balance between the two, so that the dealer who allowed a high price and the dealer who paid a low price, can get together on a selling price. The dealer who bought his second-hand cars at a low allowance, quite naturally believes he can move them at his own lower price more rapidly than the dealer who paid high for them. Hence the former man does not want to raise his prices to meet the latter dealer even half way. The result is that there is no middle ground on which dealers in new cars can meet for the sale of the used cars they have taken in."

OPEN-AIR MARKET UNDERSELLS DEALERS

There seems to be a whole lot of truth in this man's analysis of the used-car situation, and there seem to be some others, mostly men who have been merchandising in other than automotive lines, who have arrived at the same conclusions. The result is that a new method of disposing of the used car, and, by the way, of enabling the owner of an old car to get a new one in a slightly different manner, has been put into action in the cities around San Francisco Bay, as well as in other parts of northern California. This is the open-air automobile market, literally a "curb market" for automotive vehicles, from a ten-ton truck to a motorcycle.

These open-air markets—very few of which, incidentally, are operated by men who have been in the automotive business, except as riveters or repairmen—are operated on a three-way basis. The owner of a car can drive in, get cash for his car, get credit it for it on another and better used car, or buy a used car outright, either for cash or on time payments. Thus, the man who has a well-used car and a small amount of money, can get a better car, and so by repeating the process, gradually raise himself to a new car of better make than the one he had, without pinching the family pocketbook. Incidentally, since the operators of these yards buy and sell at virtually uniform prices, their sales figures on used cars are quite usually, in face uniformly lower than those of the dealer who takes in the used car as part payment on a new car.

The used-car owner who sells his automobile for cash has the money to pay down for a new car, if he wishes to go direct to a new-car dealer. This is an advantage to him, and relieves the new-car dealer of handling the used car. No new cars are handled in the open-air markets. Since the new state law regard-pedigrees and bills-of-sale for used automobiles is now in force, there is very little chance of a stolen car slipping into one of these open-air markets, the more especially since the operator of the market is held individually responsible for possession and delivery of such a car. Many of the open-air yards, which have been in operation only a few months, are branching out with extensive repair plants and are rehabilitating and even rebuilding cars to such an extent that they are sold with as thorough guarantees as any sold by new-car dealers who are engaged in the used-car business as a side line.

Around each one of these open markets, too, has grown up a sort of automotive center, in virtually every instance, with tire, accessory and equip-

(*Concluded on page* 34)

Nation-wide Propaganda Aimed At Bus Line Companies

Electric Railways Throughout the United States, Hard Hit by Heavy Automobile Traffic, Seek Relief in Courts

CHICAGO, Aug. 15—In a strong appeal to all persons opposed to the use of the motor truck on the highways and working under the misleading slogan, "Use the trolleys—save the highways," the American Electrical Railway Assn. has started a nation-wide campaign against the motor truck and the bus lines in many localities where this mode of passenger transportation has cut deeply into the profits of the railways. A committee of 100 is directing the campaign for the traction companies. This body works through the local electric railway companies and is succeeding in placing much "canned" editorial matter with newspapers. In most instances the propaganda is misleading and unfair.

Commenting on the subject in a recent editorial the New York Times says:

"It is announced that the Boston & Maine Railroad has abandoned two branch lines on account of automobile competition. So many preferred to ride in motor cars that the trains averaged only two or three passengers. The total freight revenue of one of the lines in 1920 was $88. The other collected in 1920, $1,713, with operating expenses of $12,940. It was a case of short lines for summer travel. They never will be missed.

"The railways have no need of jealousy or fear of their rival, amazing though its growth has been. The automobile trade paid the railways $100,000,000 for the year last reported. The automobiles of the farmers are feeders of the railways. They have expanded the area capable of economic cultivation, so that the railways get quantities of freight which never would have come into existence if the farmers still depended upon horses. It is difficult to place a limit on the growth of the industry which already has produced 11,000,000 machines. At the beginning of this year there was one car for each twelve of the population. The productive capacity of the country is a million cars more than enough to maintain the present total in operation."

BUSES SUCCESSFUL IN DES MOINES

Des Moines, Aug. 15—For more than a week Des Moines has depended entirely upon automotive equipment for transportation. Street car service was suspended upon orders of the United States Court, due to insufficient operating revenues, August 3, and since that date the city has had only buses and privately owned cars for transportation. Seventy-two buses of various makes and capacities varying from 12 to 16 passengers are in service. Half of this number are fairly well equipped. The others are largely home-made bodies mounted on trucks.

The largest individual operator is the Master Truck Co. which has 12 buses on two lines. The bus operators are handicapped by the fact that the City Council will not grant them a franchise for any given period and they hesitate to finance the proper equipment, when it may be ordered from the streets at any time. With only mediocre equipment thus far, the trial has been fairly successful and has received the support of two of three daily newspapers. The bus operators claim to be carrying 55,000 passengers daily which is approximately the same number carried by trolleys before the suspension.

Two companies have asked for bus franchises to take over the entire city, but the Council has not considered it seriously. The present arrangement is by a group of individual owners working through the Bus Operators' Assn. Buses follow the car tracks but do not give transfers. The fare is five cents with six tickets for a quarter in lean hours.

JUDGES JAIL JITNEY JEHUS

Charleston, W. Va., Aug. 13—The attorney general of West Virginia has recommended that the motor bus controversy, which has been in progress for two weeks at Wheeling, be carried to the supreme court.

The fight, being waged between operators of bus lines and officials of the Wheeling Traction Co., has already resulted in serious injury to a number of persons during a riot a few nights ago.

Traction company officials claim the bus lines are violating the law, in that they have failed to obtain permits from the state road commission, as provided in the new state road law. They assert the law became effective May 2, 1921.

In retaliation, the operators of bus lines declare the law relating to permits does not become effective until December 31, 1921.

And as an anti-climax, the state road commission issued its rules and regulations requiring bus lines to have permits on and after August 9, 1921.

The question is admittedly too complicated for the attorney general's office, and it will likely be appealed to the higher tribunal.

In the meantime, officials of the traction company continue to have warrants sworn out for the alleged violators and they are being placed in the jails by the dozens.

C. E. McCoy, head of the automobile bureau of the commission, has returned to Charleston after visiting Wheeling and admits that he cannot settle the controversy.

FIGHT BUSES IN ILLINOIS

Chicago, Aug. 15—Claiming that an injunction procured by the Chicago and Joliet traction line to prevent the operation of the motor bus line now operating between Lemont, Summit and Argo in northern Illinois, is not binding, the promoters of the latter have continued the machines and propose to do so. The Illinois Commerce Commission heard the arguments of the traction line asking that a certificate of convenience and necessity be withheld but failed to announce a decision. As a result, the buses have continued to operate and will do so until a decision is filed.

A similar injunction was procured and a similar protest made before the utilities board in the case of the Des Plaines Valley bus line, which is also said to be injuring the electric line because of competition. The Chicago, Ottawa and Peoria electric line also complains about the competition of a bus line which operates between Starved Rock and Peru.

JITNIES JUNK ANOTHER

Bay City, Mich., Aug. 13—Service has stopped on the Saginaw-Bay City Railway Co.'s lines, operating local systems in the two cities and an interurban line. Declaring that it could not meet motor bus competition and the low rate of fare demanded by the city councils of the towns, the company has gone into bankruptcy.

SEE HAND OF RAILWAYS

Sacramento, Aug. 13—A state-wide effort to curb the use of motor trucks in favor of rail lines is seen by automobile distributors and dealers, and operators of truck fleets, in the efforts which virtually every county in the state is making to limit the load a truck may carry over its roads.

While there has been no open indication of lobbying by the railroads, the remarkable unanimity of action in several counties of California would indi-

(Concluded on page 27)

EDITORIAL

Possible Fall Business for Dealers

WITH crop conditions fairly well understood, and the crops nearly matured, the automotive distributors of North Dakota are arriving at their estimates of the possible fall business in the sale of cars, trucks and tractors, and also in the possibilities for business of next spring.

North Dakota as an agricultural state is typical of those areas where business in all lines other than agriculture is reflected almost directly in the condition of crops. As North Dakota did not profit during the war by large crops and war prices, business in the state did not get far away from the crop, whereas in other states that profited in many ways from war stimulation the relationship between business and crops was partly lost sight of. It can be truly said of North Dakota that business follows the crop. This can be more truly said of other agricultural areas now that the artificial stimulations of war are past.

Crop conditions in North Dakota are in general a little better than a year ago. In the southwestern part of the state there is literally no crop, whereas a year ago they had some crop. In some of the sections this year's crops are better. In the Minot area in the northwest, with the exception of a local zone surrounding the city, crops are 50 per cent better than a year ago. In the Devils Lake area in the central north they are 25 per cent ahead of last year. In Grand Forks, representing the northeast, they are as good as last year. In Fargo, representing the southeast, they are about the same as last year. In general, motor business throughout North Dakota during this fall and next spring will largely reflect these crop conditions.

In a canvass made with automotive distributors in the cities of Fargo, Grand Forks, Devils Lake and Minot three questions were asked:

1. To what extent do you think the farmer will be a greater buyer of automobiles and tractors, in the next 12 months than he has been in the past 12?
2. How much improvement in the sale of automobiles to the agricultural community are you expecting during the coming fall?
3. Do you think the city and town population will constitute as good a market in the next 12 months as they have in the past 12?

Question 1

The farmers' purchases of this fall will pretty generally be reflected by the crop condition, according to the opinions of the distributors. In Minot, where crop conditions are good, distributors of low-priced cars expect a greatly increased business over last fall. As the scale of prices increase a distributor does not expect a much greater business with farmers. Business last fall with farmers was practically nil, a fact which should be kept in mind. Some distributors believe that car prices will be a determining factor and that the farmer is not yet over his buyers' strike. There is, however, a general optimism and accord among the distributors that fall business will be better.

One tractor distributor in Devils Lake, where crop conditions are 25 per cent better than a year ago, hopes to sell twice as many tractors as last year, and feels that the automotive sales of the territory will be greater this fall. Even in the Fargo area where crop conditions are about the same as a year ago, more country sales are expected this fall than last fall by distributors handling medium-priced cars.

Question 2

In letters from many distributors there is general agreement that business for the next 12 months will show an improvement over the last 12. The farmer will be a better buyer. He will be in better humor. He will have liquidated many obligations and while he may not have much money, he will be more favorably disposed. His credit will be better. Automotive apparatus has been wearing out during the past 12 months and in agricultural areas of sparse population the motor car is such a necessity that the farmer cannot do without it. There is no such thing as an automobile being considered a luxury in such a state.

Question 3

The purchasing capacity of towns and cities in North Dakota is not so definitely agreed upon by distributors in different cities. Minot distributors where the crop is 50 per cent better than last year, believe that city buying in the next 12 months will reflect crop conditions, and that buying will be heavier. Some distributors do not agree on this. They say that many city buyers are shorter of money this fall than they were a year ago. In cities like Fargo the general feeling is that city buying will be in proportion to crop conditions. The same view is held by Grand Forks distributors.

The Flat Rate System

THERE seems to be some doubt in the minds of many as to the adaptability of the flat rate system to every service station. The point generally raised is that the system is unfair to the man who takes care of his car. To wit, Jones and Smith both own Runwell cars. Jones is a careful driver and takes good care of his car. Smith is careless and abuses his car. Both come into the service station and want their springs lubricated. It is a comparatively easy job on Jones' car. The leaves open readily and the job can be done in about half the time it takes on Smith's car, because here the springs are rusted together. Both are charged the same amount for the work, under the flat rate system; therefore, theoretically, Jones is paying more than he should and Smith not enough. However, one dealer does this: he figures out the amount of time saved on Jones' car and splits the equivalent between Jones and the mechanic who did the work. Jones has been repaid for being a careful driver, the mechanic is repaid for doing the work in less time, and everybody is happy.

"Let Bankers of Country Be Decent Just This Once"

W. C. Durant

Solution of the Gravest Problems Before American Business Men Today Lies in Hands of Money Kings, Who Refuse Fair Interest Rates and Demand Liquidation

NEW YORK, Aug. 15—Recovery of the automotive industry, which is suffering from the same causes as all other industries, will be surprisingly rapid and will take the lead in industrial activity, in the opinion of W. C. Durant. The automotive industry is and will continue to be an essential factor in the development of civilization, he contends. It has gone through its period of reconstruction, has organized its methods to meet the new order of things, and is better prepared today for a running start than almost any other branch of industry.

The solution of the gravest of the problems which confront the business men of the country rests upon adequate capital, Durant asserts. In this connection he says:

FINANCIAL CRISIS RESULT OF RESTRICTED CREDIT

"When cheaper money is available for business men who need it, when credit is extended in generous measures to business men who are entitled to it, when government securities have been put on a 100 *per cent basis, we will hear less about frozen credits, courage will be restored and the usual American action, which we all so much admire in place of indifference and apathy, will be in evidence and we will quickly get back to normalcy."*

The views of Durant, long a real captain of industry, are contained in a statement prepared by him for the current issue of Commerce and Finance. In this statement he arraigns mercilessly the attitude of big bankers and charges them with exploiting the needs of legitimate business for selfish purposes. In this connection he says:

"I contend that much of our present distress is due to extortionate interest rates and restricted credits. In this financial crisis the bankers have not met the situation and are largely responsible for the chaotic condition now existing.

"Never in the history of this country was there greater need for low interest rates and more elastic credits.

"Instead of helping to relieve the situation and restore order, the bankers and those in control of the money supply and credits have been taking advantage of a situation. For months call money rates have been outrageously high, with time money almost impossible at any rate—and this condition exists with our natural and accumulated wealth, with nearly one-half the gold of the world in our possession and with a great federal reserve bank created for the purpose of doing a real service to commerce and industry in an emergency.

"If money and credit are available only for certain preferred purposes and at certain rates, business is bound to suffer. The Sherman Law and Clayton Act are intended to prevent monopoly and control, but no good plan has yet been worked out which gives to a perfectly solvent concern the ability to obtain a line of credit to which it is entitled at terms that are just and legal.

"At a time when business in every industry and commercial line is suffering and business men in all lines are carrying tremendous burdens, the bankers are exacting the highest rates ever known and forcing liquidation beyond all reason. Word went forth some time ago, 'Liquidate and pay.' And liquidation has been going on at a fearful rate and at a terrific sacrifice.

"Is it any wonder that the business men of this country are a bit discouraged and disheartened?

"The federal reserve bank was created for the purpose of meeting emergencies. How did it meet this present emergency? By establishing unattractive and prohibitive rates, **making last year the enormous profit of 200 per cent—by advocating and encouraging liquidation in the face of a business and industrial crisis such as this country has never before known. Result: business paralysis, with industry, the life of our country, so weakened and enfeebled as to make recovery slow and painful.**

BANKS SHOULD CEASE FORCING LIQUIDATION

"In the meantime, our great and noble bankers are 'waxing fat.'

"I recall recently having heard of many of our well-established and well-managed concerns in industrial pursuits reducing or passing dividends, but I have yet to hear of a single well-established or well-managed bank reducing or passing dividends or showing any falling off of earnings.

"The bankers have been, and are, at sea, with no real leadership and no real remedy.

"'And what have you to suggest?' you ask. My answer is: give the business men of this country 1 per cent call money. Let the federal reserve bank establish a discount rate of 3 per cent. Let our banks stop forcing liquidation. Let our banks extend rather than curtail credit.

"Let the big bankers of this country, who control the money situation, do the right, fair, honest, decent, unselfish thing just this once, and for their own good and safety and the benefit and safety of this country and our people, do it now."

Bankers Waxing Fat at Sea

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When cheaper money is available for business men who need it we will hear less about frozen credits

Instead of helping to relieve the situation bankers and those in control of the money supply have been taking advantage of the situation—they are waxing fat.

The bankers are at sea with no real leadership and no remedy.

Let the big bankers of the country, who control the money situation, do the right, fair, honest, decent, unselfish thing just this once, and for their own good and safety and the benefit and safety of this country and our people, do it now.

Graham Resolution Passed By House, Pleases Senate

Washington, Aug. 15—From the viewpoint of motor truck manufacturers and dealers the most important legislation acted upon in Congress since the war was the passage in the House, by a vote of 186 to 83, of the joint resolution introduced by Representative Graham, Illinois, which would impose a 90 per cent ad valorum duty on all goods sent to France and England from the United States during the war and reimported for sale in this country. Every effort will be made to get favorable action on the resolution in the Senate before recess is taken. Senate leaders have already expressed themselves favorably.

Atlanta Automobile Institute Has $2,000,000 Capital

New Concern to Offer Something New to Trade in Way of Service

ATLANTA, Aug. 13—With a capital stock of $2,000,000 and headed by Walter T. Candler, vice president of the Central Bank & Trust Corp., and one of the best known business men in the south, the Lullwater Co. has been organized and incorporated to establish an automobile industrial institute in Atlanta. Lionel J. Kahn has been named general manager of the corporation. Several prominent business men are connected with it as original incorporators.

The purpose of the company is to assemble under a single roof separate and individual industrial units of every kind connected with the automotive business. The idea is to make it possible to rebuild an automobile or a truck in this plant, or to repair any automobile or truck regardless of make.

Will Have General Parts Department

This plant will include complete paintshops, trimming and upholstering department, a silver and nickel plating department, and departments, each separate, for welding, boring, grinding, etc. In addition, the institute will accommodate tire, battery, accessory and automobile novelty dealers, and there will be a general parts department that will stock parts of every standard make of automobile in use in the southern states.

The new company has leased from Walter T. Candler one of the largest automobile buildings in Atlanta, which is located on automobile row and provides 114,000 sq. ft. of floor space. The building is five stories in height and preparations are under way to get the institute into operation as soon as possible.

TIRE MAKERS MEET SEPT. 22

New York, Aug. 15—The first of the quarterly meetings of the tire manufacturers' division of the Rubber Assn. of America will be held Sept. 22. The executive committee will hold its regular monthly meeting the previous day and such recommendations as may be formulated then will be considered at the division meeting. Two important questions under consideration are mileage adjustment and protection against price decline.

FRANKLIN GIVES MID-YEAR ACCOUNT

Syracuse, Aug. 13—H. H. Franklin Manufacturing Co. in its mid-year statement to stockholders dated June 30, reports net sales for the first six months of 1921 of $14,393,858, with a net profit of $735,826. The net income for that period was $876,561. Sales for the six months equalled 82 per cent of sales for the same period of 1920, and June sales of 1046 cars were the largest for that month in the history of the company.

Cash on hand June 30 was $850,386, compared with $1,748,294 on Dec. 31. Sight drafts and government bonds were $293,853 as compared with $986,558, accounts and notes receivable had increased to $715,154 from $591,202. The merchandise inventory had been cut down to $5,990,701 from $7,614,695. Total current assets were $7,850,096 as compared with $10,940,752 six months earlier.

There was a very large reduction in current liabilities for the first half of the year, the total being $2,528,360 as compared with $7,368,180 on Dec. 31. Bank loans of $4,510,000 were wiped out completely. Current accounts payable and miscellaneous liabilities were $2,528,360 as compared with $2,858,180. The company reserved $2,209,421 for depreciation of fixed assets.

FISK PRODUCTION INCREASES

Springfield, Mass., Aug. 13—With a production of nearly 10,000 casings and 13,000 tubes daily, the Fisk Rubber Co. is operating its Chicopee Falls plant at 90 per cent of its peak capacity, officials announce. At the bottom of the winter depression, it was down close to a 30 per cent basis. The August production schedule upon which the factory is now working calls for 225,000 tires, an increase of 32 per cent over the July output of 170,000 tires, which in turn represented an increase of nearly 50 per cent over June. The May output was but 65,000 tires.

Every month since May has shown a sales increase over the previous month for Fisk. Not only that, but the last three months have been ahead of the same period in 1920.

ROAD SCANDAL UP TO GOVERNOR

Sacramento, Aug. 13—Demand that Governor William D. Stephens take official action relative to the charges of inefficiency and mismanagement of state highway affairs made by the California State Automobile Assn., is contained in a resolution adopted by the Cloverdale Farm Center and endorsed by the directors of the Sonoma County Farm Bureau.

The resolution which has been forwarded to the governor follows:

"Whereas, the State Highway Commission of California has been charged by the California Automobile Assn. with certain mal-administration and gross waste of public money in the building of state highways; and

Whereas, this is a matter of great importance to every taxpayer in California, now, therefore, be it

Resolved, that the Cloverdale Farm Center hereby requests Hon. Wm. D. Stephens, governor of California, to have the acts of the State Highway Commission impartially investigated to the end that these charges may be either disproved and the commission vindicated or proved and action taken to remedy the state of conditions alleged."

Hearne Wins Cotati Race, Breaking Mulford's Record

Drives Duesenberg Special 150 Miles in New Bowl in 1:21:19 1/5; Sarles 2d, Milton 3d

COTATI Bowl, Calif., Aug. 15—Official speedway records for small cars in the United States were broken by Eddie Hearne, driving a Disteel-Duesenberg in the 150-mile race which opened the Cotati Bowl, hereafter to be known as the Northbay Speedway, on the afternoon of Aug. 14. Thirty thousand people saw Hearne do the 150 miles in 1:21:19 1-5. This is an average of more than 110 miles an hour, and in three different laps Hearne was clocked at the rate of 115 miles.

Tommy Milton, who was picked as the winner by a number of experts prior to the race finished third, driving a Durant Special in 1:24:47 4-5. Roscoe Sarles, in a Duesenberg, finished second in 1:22 1-5.

It was Duesenberg day at the new bowl, for fourth place went to Eddie Miller, in a Duesenberg, in 1:9:58 1-5. Alton Soules, in a Frontenac, slipped into fifth place in 1:30 1-5, while the Duesenberg appeared again when Joe Thomas flashed across the line in 1:42:18 1-5. Hearne, who always has been a safety-first driver, surprised his friends by setting a terrific pace at the start and maintaining it all around the 120 laps of the big wooden bowl. Hearne drew the favorite position at the start, took the lead and though Soules forced him to hit the 115-mile gait on two or three occasions, the little man who got the jump at the start never was headed. In the 49th lap, however, Soules was forced into the pits for a new tire, and Roscoe Sarles moved up into second place, which he held to the finish, though Hearne lapped every contestant in the race.

Not an accident marred the day, either at the bowl or in the handling of the crowds by train and automobiles. The weather was perfect and the opening of northern California's first speedway was most auspicious.

Hearne carried off the $5000 first prize; Sarles got $3000, Milton $2000, and the remaining six entries various prizes down to $500.

These other entries and the cars they drove were: Frank Elliott, Leach Special; Tom Alley, Disteel-Frontenac; Johnny Thiele, Thiele-Duesenberg; Jim Crosey, Lans Spar Special, and Mike Moosie, Kleinworth Special.

Officials for the opening of the track were: Eddie Rickenbacker, honorary referee; Cliff Durant, pacemaker; Paul Derkum, starter; E. H. Pendleton, timer; D. H. Lafferty, referee; E. F. Chaffins, representative of the contest board of the A. A. A., and Less Manning, clerk of the course.

The judges were: George S. Forderer, Percy E. Towne, Edwin F. Merry, and D. E. Watkins.

Better Business Continues in Northern California

Cash Sales Feature in Market Where Inquiries and Volume Steadily Increase

SAN FRANCISCO, Aug. 13—A rather unusual, yet generally favorable condition developed in the merchandising of automotive vehicles, particularly passenger cars, during July in northern California. While retailers reported sales about 20 per cent above those of June, distributors announced that the ratio of country sales to city sales, usually about three and one-half to four to one in favor of the country sales, had fallen to three to two. To counterbalance this apparent decrease in country sales, however, distributors said they had reports from dealers throughout the rural districts, indicating that prospects were more numerous than they had been in eight or 10 months. The condition these outside dealers reported is that the farmers and others engaged in handling products of the soil, are waiting until the money begins to come in for this year's crops before buying passenger cars.

Dealers Are Optimistic

Both country dealers and distributors interpret this as meaning that sales will be considerably better in the latter part of August and throughout September than they have been for some time. The people are going to buy cars, according to these distributors, but they are planning to pay cash for them, and they have to wait until they have the cash to pay. The surprising fact is that so many people are buying, for, in general, sales are considerably above the June record, and are better than they were in July, 1920.

The city dealers lay the increase in sales over June to two causes:

"Reductions in prices on cars priced from $900 to $1500."

"The spread of an idea among the buying public that conditions in business are about as bad as they will get and that they might as well take advantage of these bad conditions to purchase; so if they need passenger cars, they buy them."

This seems like a peculiar condition to influence buying of cars, but many of the dealers are of the opinion that it is one of the principal causes of the revival of sales.

The dealers' associations throughout northern California are highly pleased with general merchandising conditions, and expect improvement ranging all the way from 100 per cent in the centers of distribution in the agricultural sections of the state, to 50 per cent in the largest city—San Francisco. The best feature of the whole situation, however, is that the dealers are not "living on hopes," but are going right along selling cars in sufficient numbers to show good figures on the right side of the ledger. Cash sales are more numerous than they usually are at this time of year, and more prevalent than they have been at any season within the past 18 or 20 months The termination of the marine strike, and the adoption of the American plan by a majority of the industries of San Francisco, with its consequent ending of a building-labor strike in Alameda county, and its prevention of other incipient strikes, also is considered to have had some effect on July sales. The whole situation seems more stable than it has in some time, and nothing more than the condition of general business during the past few months could have shown more plainly the close relation between the automotive industry and all other industries of this section of the country.

Was the Pachyderm a White One?

SAN FRANCISCO, Aug. 12—"Trilby" Fowler, trick rider of the day when the high-wheeled bicycle was the mark of aristocracy on the road, recently carried out a clever advertising stunt, sent several traffic cops to the dry-dock for repairs, and had everybody talking about the Buick.

A vaudeville show, in town with a baby elephant, started "Trilby" on his way. He borrowed the young pachyderm, loaded it into his automobile, and in fifteen minutes had 3,000 or more kids following him all over town. It was the elephant's first trip in a car, and, if the police have anything to say, will be his last.

Grand Central Palace to House Gotham 1922 Show

New York, Aug. 12—Definite announcement is made by the National Automobile Chamber of Commerce that the annual New York show will be held at the Grand Central Palace, Jan. 7-14. Earlier in the year it was supposed the Palace would not be available, and Madison Square Garden was the next best location. Plans for converting the Palace into offices have been delayed, however, and the N. A. C. C. will be able to use it for the 1922 exposition, which will be one of the most important ever held.

WILLY-OVERLAND PAYS $2,000,000

New York, Aug. 12—Fulfilling the promise made a short time ago by John N. Willys that a part of the cash surplus of the Willys-Overland Co. would be used on Aug. 1 to make a substantial reduction in the corporation's bank indebtedness, 10 per cent of the bank claims were paid on that date. The obligations of the company to bankers approximate $20,000,000. The payment, therefore, was about $2,000,000. This will leave a substantial amount of cash on hand.

Barney Everitt in Control of Rickenbacker Company

New Entrant Into Automobile Field Will Make Its Bow at Annual Shows

DETROIT, Aug. 12—Rickenbacker Motor Car Co., the latest entrant into the Detroit automotive field, will take over the Everitt Bros. plant in from 60 to 90 days and will at once tool up for production the first of the year. The first Rickenbacker cars will be exhibited at the New York and Chicago shows and at all leading shows of the season.

The Everitt plant, which is owned outright by Byron F. (Barney) Everitt, is turned over by him to the Rickenbacker company, of which he is president, for a consideration of $2,000,000. One million of this is paid in stock of the new company and he has subscribed for $1,500,000 more. In the incorporation of the company as filed here, Everitt is shown as practically sole owner of the company's stock, but this later will be apportioned to the other men associated in the company, with Everitt retaining control.

The automobile painting and trimming business of Everitt Bros. will be removed to another plant in Detroit, for the purchase of which Everitt is now negotiating. Three plants are under consideration, he said, one of which will be selected in the near future.

Will Afford Sufficient Working Space

Present buildings of the Everitt plant on Harper avenue will afford the Rickenbacker company sufficient working space for the production of 20,000 to 25,000 cars a year. There is also unoccupied acreage included in the purchase to permit of tripling or quadrupling present capacity, should it be required.

When the removal of the equipment of the Everitt plant is started the installation of the Rickenbacker machinery will follow at once. This will be done rapidly for the company has economized on time by having patterns made for the various equipment required, as the development of the car progressed. This has covered two years and 10 months and the company is ready today with all its patterns for machinery and machine tools.

Every bit of the equipment will be specialized to the finest degree, according to the company's plans. Contracts for everything it will require are now being placed. It will start off the first of the year with an absolutely clean slate, all equipment and material bought at what Everitt regards as absolutely bottom prices. In his opinion material prices are now as low as they will get and may show slight advances from this time on.

Details as to prices and specifications of the new car will not be released until the cars are placed for exhibition at the shows. It will be a medium priced car, Everitt said, and will be up to the minute in every particular of its make-up.

Tax Muddle Staggers From Flat Rate to Horsepower

Automobile Industry Seems Doomed to Bear Unequal Share of Revenue Burden

WASHINGTON, Aug. 13—One of the outstanding developments of the proposal of the Secretary of the Treasury for a flat levy of $10 on automobiles and trucks was the realization that 10,000,000 automobilists regard their machines as essential to their welfare and prosperity. There has been an unmistakable reaction against the Treasury plan and Congressional leaders were quick to voice the sentiment. It now appears that if the automobile is assessed as a means of additional revenue, the tax will be graduated according to horsepower. It is significant to note that nowhere in the tax discussions has the repeal of the excise taxes been favorably mentioned.

The latest tax proposal has awakened the automobile owner to the fact that there is reasonable grounds for the claim of the National Automobile Chamber of Commerce that the industry has been singled out for so-called "stigma taxes."

Treasury Wants Another Assessment

Heretofore, the average automobile owner paid little attention to the fact that he paid a large sum in taxes when the car was purchased. Now that the Treasury wants another assessment, the car owner has figured the total taxes and discovered that national, state, municipal and road taxes placed him in a distinct class in that the total exceeded any other group. The net result is that the industry has gained an ally in fighting discriminatory taxation. The Secretary of the Treasury has quite unwittingly made the country cognizant of the true position of the automotive industry as it relates to taxation, and strengthened it accordingly.

The agitation conducted by the N. A. C. A. and other organizations in behalf of the sales tax has failed to make an impression. The House Committee on Ways and Means has not considered it and, in fact, ruled against the admission of testimony dealing with the plan. This action indicates that the committee tax bill will have nothing to do with sales taxes. The Treasury has refused to endorse it, thus placing the Administration in opposition. Senator Penrose, chairman of the Senate Finance Committee, has expressed the belief that the sales tax was a back number and would receive little consideration from the committee when the internal revenue bill is before the Senate committee.

The President summoned Senate and House leaders to the White House to discuss the tax muddle. The question of abolition of the excess-profits tax is giving much trouble to tax framers. Owing to the need of large revenue for the fiscal year, there has been talk of retaining the iniquitous tax, though the Administration is committed to its repeal. Statistics have been submitted by the Treasury showing that the increase of 5 per cent in corporation taxes and the cancellation of $2,000 exemption would not bring sufficient revenue to fill the gap left by the elimination of the profits tax. Every effort is being made to rid the statutes of the obnoxous and oppressive tax, but it is a real problem. Other substitutes will be required as there is a difference of approximately $150,000,000 in the yield of the 15 per cent corporation tax and the excess-profits returns.

PUEBLO RELIEF FUND $1,725

St. Louis, Aug. 15—Seventeen hundred and twenty-five dollars has been contributed by local automobile dealers' associations and the National Automobile Dealers' Assn. to the N. A. D. A. fund for Pueblo flood relief. This money has been forwarded to a committee of which Tom Botterill of Denver is chairman for relief of dealers and accessory men in Pueblo.

The following is a list of the associations who have already sent checks:

Des Mones, Ia., Chamber of Commerce, Motor Trades Bureau	$ 100.00
Detroit Automobile Dealers' Assn. (Mich.)	100.00
Minneapolis Automobile Trades Assn. (Minn.)	100.00
Newark Automobile Trade Assn. (N. J.)	100.00
Chicago Automobile Trade Assn. (Ill.)	100.00
Milwaukee Automotive Dealers' Assn. (Wis.)	100.00
National Automobile Dealers' Assn.	100.00
Automobile Trades Assn. of Atlantic City (N. J.)	50.00
Automobile Dealers' Assn. of Wheeling (W. Va.)	50.00
Washington, D. C., Automotive Trade Assn.	50.00
Sioux Falls Automobile Assn. (S. D.)	50.00
La Crosse Automobile Dealers' Assn. (Wis.)	25.00
Automobile Trade Assn., Lancaster (Pa.)	25.00
Eau Claire Automobile Dealers' Assn. (Wis.)	25.00
Worcester Automotive Assn. (Mass.)	100.00
Kansas City Motor Car Dealers' Assn. (Mo.)	250.00
Linn Co. Motor Trades Bureau, Burlington, Ia.	25.00
Indianapolis Automobile Trade Assn. (Ind.)	250.00
Motor Trades Assn. of Riley Co., Manhattan (Kans.)	25.00
New Haven Automobile Dealers' Assn. (Conn.)	50.00
Total	$1,725.00

WESTCOTT REDUCES PRICE $1100

Springfield, O., Aug. 15—Effective Sept. 2 the Westcott Motor Car Co. will make reductions in the price of the Westcott car equalling 30 per cent in some models, or $1100.

Following are the new prices F. O. B. factory, as compared with present prices.

	Old	New
Lighter six—		
Touring	$2290	$1890
Roadster	2290	1890
Coupe	3390	2890
Sedan	3390	2890
Sport	2390	1990
Larger Six—		
Touring	$2990	$2090
Sedan	4590	3490
Limousine-sedan	4690	3690

Two Automobile Forces in Washington Arrange Union

State Chamber of Commerce and Automotive Trade Assn. Name Amalgamation Committees

SEATTLE, Aug. 13—Amalgamation of the Washington State Automobile Chamber of Commerce and the Washington Automotive Trade Assn. will, in all probability, result from the action taken by the two organizations at separate conventions which have just closed. The Automobile Chamber of Commerce held its convention in Spokane and the Automotive Trades Assn. immediately followed with its convention in Tacoma. A committee of six representing each organization was appointed to meet jointly to discuss the proposed unification of the automotive forces in this state.

Washington A. C. C. Seven Years Old

The Washington Automobile Chamber of Commerce was organized seven years ago and was affiliated with the National Automobile Chamber of Commerce. The Washington Automotive Trade Assn. was formed a little over a year ago. J. H. McDiarmid, Seattle, was re-elected president of the Automotive Trades Assn. The four vice presidents elected were: W. F. McKenzie, Spokane; Fred Burrows, Yakima; R. R. Matthews, Tacoma, and Waldemar Bronson, Olympia. William Simonds, Seattle, was re-elected secretary-manager. The executive board is composed of 12 members, six of whom represent the various crafts of the automotive industry and the other six are chosen at large from the membership. The board of directors consists of H. E. Komitch, representing the battery men; A. B. Cunningham, motor car dealers; Robert S. Taylor, repairmen; Ted Jungmeyer, garagemen; John Ferguson, accessorymen, and R. E. White, tiremen; and the following six were chosen at large: J. J. Gravelly, Kenneth McAlpin, J. Kulp, A. Rose and L. W. Harkins.

The newly-elected officers of the Washington Automobile Chamber of Commerce are: president, L. E. Titus, Centralia; vice president, E. C. Finlay, Spokane; board of trustees, Fred Chandler, Yakima; A. C. St. John, Chehalis; A. S. Eldridge, P. E. Sands, H. P. Grant, William Eaton, W. A. Wicks, C. H. Shields, W. C. Tyson, George Gunn, Jr., and Alfred G. Ayers, Seattle; W. E. Bronson, Olympia; John Doran, G. R. Riegel, R. F. Blackwell, Harry L. Olive and Philip Garnett, Spokane; T. W. Little and L. W. Harkins, Tacoma; George Cornelius, Colfax, and Harold Dahlen, Walla Walla.

25,000 CARS IN MIDGET STATE

Wilmington, Del., Aug. 13—During the first six months of this year 18,800 motor cars were registered in Delaware, 2,200 more than in the corresponding period of last year. Before the end of the year, it is likely, there will be 25,000 cars in Delaware.

Light Truck Parts Feature Detroit Makers' Business

Great Improvement Cannot Come in This Branch of Industry Until Fleets Run Again

DETROIT, Aug. 15—Business with parts makers in the Detroit district is good or bad according to the dependency on the truck industry. Those parts makers doing most of their business with passenger car makers find conditions holding up well; those relying upon truck orders for a large per cent of their activity are working along on a 50 per cent basis, some a little more, some less.

Truck parts makers do not look for real improvement in conditions until spring, though they expect a better business during the fall months due to farmer buying. Real improvement can not come until industrial companies start using their trucks again, the parts makers citing their own cases to show that they are using only a few trucks of their own fleets.

In the passenger car field, business has been at a satisfactory, if not normal capacity for the past three months. This same ratio is being maintained today and will continue at least for August and part of September. Further than this it is impossible to forecast accurately owing to the prevailing tendency of holding orders to a 30-day basis.

Virtually all business now being done by parts makers is on a 30-day basis. Though this has had a tendency to keep operations uncertain, it has resulted in a large amount of business being done and many standing orders have been greatly reduced, making certain a large amount of reordering soon to follow.

In quite a number of instances new orders are already being placed and many companies report inquiries which seem bound to develop new business. One condition which stands out prominently in the statements of parts makers, and which is the cause of genuine optimism, is that there are very few cancellations being made.

Orders from manufacturers of light delivery trucks have gone a long way toward keeping business moving along as satisfactorily as it has. Parts makers feel that there is, for the present at least, a far greater opportunity in this field than in the heavy-duty field, and expect a more general production of this class of truck than formerly. In their opinion, too, many truck manufacturers have neglected this opportunity in the past.

ADAIR SUCCEEDS SHERMAN

Chicago, Aug. 15—The board of directors of the National Assn. of Automobile Show and Assn. Managers has unanimously chosen Neal G. Adair, editor of Motor World, secretary and treasurer. He succeeds Ray W. Sherman, who resigned when he left the executive editorship of the Class Journal Co. to become merchandising director of the Automotive Equipment Assn. E. E. Peake, secretary of the Kansas City Motor Car Dealers' Assn., is president of the Show Managers and Secretaries organization.

NATION-WIDE PROPAGANDA AIMED AT BUS LINE COMPANIES

(*Concluded from page 21*)

cate some common source of the idea of taxing the motor truck, either in money or in load-limit, out of business.

Every county in southern California is working on an ordinance to limit the loads carried by motor trucks. This ordinance provides that no truck shall carry more than a 22,000 lb. load, and the limit load of truck and trailer shall be 36,000 lbs.

SEATTLE RESTRAINS BUSES

San Francisco, Aug. 13—Reports reaching the automotive interests here are that the city of Seattle has succeeded in its attempt to put the jitney buses out of business, wherever they conflict in any way with the operation of the municipally-owned street car lines. Ousting of the buses from the streets was accomplished through a state supreme court decision, just rendered, sustaining a city ordinance controlling the licensing of the buses. A number of arrests have been made under the policy of the city council of Seattle, which is to prevent the buses from using routes competing with the car lines.

TO FIGHT RAILWAY'S INJUNCTION

Lansing, Mich., Aug. 13—Truck and bus men of this city have organized to combat the plan of G. R., G. H. & M. Railway, which is seeking through injunction proceedings to restrain operation of intercity truck and bus lines. The association will be affiliated with the Michigan Highway Transportation Assn. Through the local association the operators plan a general improvement of business methods. Officers are: F. N. Rounsville, president; G. F. Downing, vice president; H. H. Hardy, secretary and treasurer.

TO OPEN WAY FOR BUSES

Lansing, Aug. 11—Reo Motor Car Co. has given its sanction to a plan of its retail dealer in this city, whereby it is hoped to overcome the opposition of the city council to bus operation. With the way cleared to buses, there would be opened a new avenue to sales which promises at the outset 10 to 15 buses on one route alone.

The dealer has obtained from the council permission to operate a bus on a route not conflicting with street car service, for a 30-day period. Fares will be the same as railway rates, and careful record will be kept of income and operating expense. At the end of the month results are expected to show the council the advisability of the additional transportation service. With success assured on the initial route, it is planned to proceed to organize new lines.

Seiberling Notes Covered By $1,500,000 Mortgage

Trustee Issues Fifteen Hundred $1,000 Notes Secured by Real Estate All Over Country

AKRON, Aug. 15—The Prudential Securities & Realty Co., of Akron and Cleveland, created for the purpose of serving as trustee of the personal assets and liabilities of Frank A. Seiberling, founder and former president of the Goodyear Tire & Rubber Co., have negotiated and delivered to the Union Trust Co., of Cleveland, a $1,500,000 mortgage covering virtually all of Mr. Seiberling's real and personal property and corporate holdings, in order to liquidate his debts.

Under the loan the Union Trust Co. has announced that it will immediately issue fifteen hundred $1,000 notes maturing July 31, 1923. The Prudential Securities & Realty Co. was organized upon the resignation of Mr. Seiberling from Goodyear when the company passed into the hands of financial interests negotiating its $80,000,000 refinancing program.

The mortgage covers 68 parcels of Mr. Seiberling's real estate, his personal property and all corporate holdings. The mortgage lists 32 parcels of real estate in Summit county and Akron, several in Florida and Michigan, 125,701 shares of Goodyear common stock and 520 shares of Goodyear preferred stock, 9,998 shares of stock in the Ladysmith Smelting Co., Seattle; 3,214 shares of stock in the Quellman-Seaver-Borgan Co., Akron; 1,696 shares of stock in the Whitman & Barnes Co., Akron, and 1,270 shares of stock in the Ohio Savings & Trust Co., Akron.

The mortgage also covers 2,010,000 lbs. of raw rubber stored in warehouses throughout the country, which Seiberling claims was originally pledged to secure the indebtedness of the New Castle Rubber Co., New Castle, Pa., which has been reorganized by Seiberling as the Lehigh Rubber Co.

Liabilities of Mr. Seiberling's estate are listed at $6,000,000, and although the paper value of his assets shows nearly $10,000,000, it is stated that his assets could not be converted into sufficient cash to entirely liquidate his debts. According to the agreement between Seiberling and his creditors, secured by the Prudential company, the creditors have consented to extend the time of payment on their claims from one to two years.

PIERCE-ARROW PRICES DOWN

Buffalo, Aug. 15—New price of the standard seven-passenger Pierce-Arrow touring car is $6,500 at factory, the enclosed car prices being graded proportionately. It has also made sharp reductions in prices of its trucks. The prices follow:

	New Price	Old Price
2-ton	$3200	$3750
3½-ton	4350	4950
5-ton	4850	5700

Dealer's Plan Moves Used Machines on Pacific Coast

Do Away with Auctioneer and Depend Upon Advertising in Selling Cars

SAN FRANCISCO, Aug. 13—In their efforts to move the used cars on hand, and to find the solution for a problem which seems destined always to be with the retailers of automotive vehicles, the dealers of San Francisco are using what they call "the newspaper auctioneer." This consists in one or more pages in the newspapers, usually on Sunday, but run on other days with success, in which all the dealers combine to announce, over their names, the used cars they have for sale, the condition of these cars and the prices asked for them. No new cars are mentioned, nor are the names of the new cars handled by the respective dealers printed in any part of the page.

The dealers agree that these prices are fixed and are the minimum figures at which they will sell the cars named. They also guarantee to stand back of any statement as to age, condition or capacity of any used car so advertised. The result is that the man who wants a used car can go through this page and learn exactly what he can get at the price he has to pay, and what he can expect the car he buys to do for him.

The idea, according to the dealers, has moved used cars for them when no other method of advertising succeeded in disposing of them. The dealers, and the distributors as well, are, in many instances, opposed to the open-air market for used cars, and virtually all of them are against the automobile auctioneer. One dealer put their argument this way:

Unintentionally Exaggerates Qualities of Car

"The auctioneer is not always particular what he says about the good qualities of a car; frequently he unintentionally exaggerates these qualities. This sometimes misleads the buyer in a manner which the dealer would not do. The auctioneer costs money; he must get more out of a car than the dealer would need to get to make a profit if he sold it from the floor. Consequently, the buyer has to pay more than he would have had to pay had he followed the 'newspaper auctioneer' and bought direct from the dealer. When the buyer finds that he has paid, say, $150 more by bidding at an auction than he would have had to pay had he bought direct from the dealer, he is going to have an unfriendly feeling toward the dealer who held the auction. That's all human nature, but it works out badly for the dealer, so the Motor Car Dealers' Assn. of San Francisco has decided to eliminate the automobile auctioneer and use advertising instead, giving the buyer the benefit of the difference."

The used-car market in San Francisco, Oakland, San Jose, Berkeley and other cities of this section is fairly active in cars selling up to $1,000, but a used-car held at a price beyond this is very hard to move. The man who has the money to pay $1,000 or more for a used car will buy a new car for that price. Once upon a time, the man who bought a Ford was a prospect in the future for a Chevrolet; the buyer of a Chevrolet for a Buick; the Buick owner for a Studebaker and so on, but this condition is passing away, and there have been a number of cases in which men who had had a more expensive car for a year or so have sold it and turned the cash in for a new lower-priced car.

Though many of the dealers believe that it is impossible to get all the dealers together in a cooperative used-car selling plan, or to bring them with all their used cars into one big sales-place, there is, nevertheless, a certain unanimity in the prices asked by the various dealers for used cars. This puts the buyer in the position of knowing that he is getting value for his money when he buys a used car, and has tended to make the market for the medium priced used cars better than it has been.

Used trucks are in demand, with few offered.

Five Sections Built Into Modern Road

SAN FRANCISCO, Aug. 13—The first highway of its kind in the United States has been constructed in Contra Costa County, to connect Martinez with Oakland. It is known as the Franklin Canyon road, and is built of two slabs of concrete, eight feet wide and five inches thick. Between the two slabs is a four-foot strip of oil-bound macadam, and on each side a two-foot shoulder of the same material, giving a 24-foot roadway. It was designed by R. R. Arnold, county engineer, and constructed under his supervision by Mrs. Ellen E. O'Brien, of Martinez, widow of W. H. O'Brien, noted for years as a contractor and road-builder in the west, and as one of the builders of the preliminary grades for the Union Pacific Railroad through the Rockies. The contract price to Mrs. O'Brien was $250,000.

Novel construction of the road has attracted much attention from motorists, road-builders, and automobile clubs and associations throughout the country.

DYER BILL FAILS PASSAGE

Washington, Aug. 12—Efforts to pass Senate bill 1060 which is an amendment to "an act to punish the transportation of stolen motor vehicles in interstate or foreign commerce," failed in the House last week and the measure was restored to its place on the regular House calendar. It is known as the Dyer bill and provides a penalty of five years or a fine of $5,000.

Would Apply Chautauqua Idea to Small Car Shows

Quincy Dealers Suggest That State Association Organize Amusement Feature Circuit

QUINCY, Aug. 15—The Quincy, Ill., Automobile Trade Assn. is planning a fall or winter show of cars, and is now engaged in seeking ideas from the other members of the state association. The suggestion is advanced that all combine to bring about better results in attracting patrons and making each event more profitable. The Quincy organization has met with the difficulty of other associations—that of supplying a novelty. As a result, the shows of the past few years in Quincy have not reached the profitable stage of those of preceding periods.

It is suggested by the Quincy dealers that all commence early to plan the fall or winter shows and exchange ideas and, possibly, arrange for a circuit similar to the Chautauqua plan, by which some attractions can play, each in turn. Something in the way of a musical attraction, starting out the first of the year and devoting a week to each city composing the membership of the state association, might work out satisfactorily.

The expense of music is always one of the leading items and seldom are home orchestras or singers able to attain sufficient merit or novelty to attract business. It might be possible to obtain a band or orchestra with vocal solos at no greater expense by the circuit plan than that incurred by the individual shows in the past.

Now is a good time to give this subject attention and an interchange of views might prove profitable. This might lead to a uniform system of decorations, the same being used in each city. The decorator, given a route and assured of 8 to 12 weeks of consecutive display, would doubtless be in a position to furnish the adornment at a much lower rate than customarily charged.

UNCLE SAM BORROWS RUBBER MAN

New York, Aug. 15—As a part of its plan to cooperate with the Department of Commerce, the Rubber Assn. of America has granted a leave of absence to P. L. Palmerton, manager of the foreign trade bureau of the association, so that he can accept the position of chief of the rubber industrial division of the Bureau of Foreign and Domestic Commerce.

The Bureau of Foreign and Domestic Commerce proposes to establish from 12 to 15 subdivisions, each of which will maintain and strengthen the contact between the particular industry and the bureau. The absence of Palmerton will not mean any lessening of foreign trade activities of the Rubber association. He will carry on much of this work in Washington, and if he finds later that this plan is impracticable the work will be handled here.

Former Goodyear President Plans Chain of Factories

Seiberling Now Controls Number of Small Tire Plants; Many Offered at Bargain Prices

AKRON, Aug. 15—Although Frank A. Seiberling, founder and former president of the Goodyear Tire & Rubber Co., has issued a formal statement through his secretary, R. C. Ellsworth, in which he denies his rumored acquisition of the Republic Rubber Co. plant at Youngstown, his recent conferences with trustees of the Republic company and his inspection of other small rubber plants, have given rise to the firm belief that Seiberling plans to stage his "comeback" in the tire industry by establishing and operating a chain of small tire plants scattered throughout the country.

Mr. Seiberling virtually is in control of the Lehigh Rubber Co., of New Castle, Pa., which he purchased some time ago at a receiver's sale. He is one of the controlling heads of the Star Rubber Co., of Akron. His secretary, R. C. Ellsworth, is heavily interested in the Marion Rubber Co., of Marion, O., while W. E. Palmer, former Goodyear treasurer, now is trustee of the Marion company. Bargain offers for the sale of the Republic plant at Youngstown are known to have been made to Mr. Seiberling.

Seiberling to Make Formal Announcement

In addition many small rubber plants throughout the country which now are in the throes of financial difficulty, have been offered to Seiberling across the bargain counter. Seiberling is expected to make some formal announcement shortly, relative to the scope of his renewed activity in the tire industry, and the number of small plants which he expects to control and to operate.

When Mr. Seiberling and his brother, C. W. Seiberling, stepped down and out of the Goodyear Co. under the refinancing program which resulted in the banking interests negotiating the refinancing, gaining complete control of Goodyear, much surprise was occasioned by the fact that G. M. Stadleman and P. W. Litchfield, Goodyear vice-presidents, would remain with the new management, and would not retire as the Seiberling regime ended. Stadleman had been vice-president in charge of sales and Litchfield had been vice-president in charge of production.

That the retention of Stadleman and Litchfield by the new Goodyear management, was a strategetic move designed to separate Seiberling from his two ablest henchmen, is the opinion held by many in Akron. Many thought both would soon resign from Goodyear through loyalty to their former chief with whom they had been associated for 20 years. But both still are with Goodyear and appear to be firmly esconced.

Soon after Seiberling retired from Goodyear, A. G. Partridge, former vice-president and sales manager of the Firestone Co., became sales manager of the Star Rubber Co. in which Seiberling is heavily interested. This move, it is claimed, is the first step towards Mr. Partridge's becoming general sales manager for the controlling company with headquarters in Akron, which will operate the chain of small rubber companies.

Many former Goodyear officials who retired with Seiberling, and several who have since resigned from Goodyear, now are under negotiations with him, it is reported, and will be lined up for the new organization.

It is also believed that Mr. Seiberling is working on new types of tires in his New Castle plant. E. L. Davies, one of the Goodyear compounders and expert rubber chemists, has resigned and has been made development manager of the New Castle plant.

Seiberling has opened luxuriously furnished offices in the Akron business district and is in daily conference with men of the tire industry. That he has unlimited capital behind him in the new venture is virtually a known fact. When Mr. Seiberling resigned as president of Goodyear he was swamped with messages of encouragement and men from all parts of the world placed their finances at his disposal for whatever new project he might see fit to undertake.

5 Elks + 1 Dog = 1 Glorious Trip

SAN FRANCISCO, Aug. 13—Five Elks and an Airedale, all in a Pullman palace motor truck fitted up with chintz-covered furniture, fluttery curtains over the windows, steam heat, electric lights, a shower-bath and all the comforts of a high-priced apartment, rolled into town recently and paused at the Elks' convention. This creation—nothing less could do it justice—anchored in front of the Palace Hotel, where out stepped from it J. W. Kaufman, owner, past exalted ruler of Columbus, O., lodge of Elks; his brother, J. T. Kaufman, present exalted ruler of the Lima lodge; H. R. Long and L. H. Cunningham, of Lima, and Lester Shepard, of Columbus. The Airedale is a "Colonel." They left Columbus June 4, and made every town, including Los Angeles, on the way to the Golden Gate. They returned also in the floating flat.

REDUCE TRANSPORT PRICES

Mount Pleasant, Mich., Aug. 12—Price reductions ranging from 11 to 25 per cent have been made on three of the four models of trucks comprising the line of the Transport Truck Co. of this city. The 1-ton model is reduced from $1850 to $1395; the 1½-ton from $2250 to $1995 and the 3½-ton from $4195 to $3885. The price of $2785 on the 2½-ton remains unchanged.

Indiana Plans to Unite Haulers Into Association

Organization's Activities Will Be Directed Toward Molding of Legislation in State

INDIANAPOLIS, Aug. 15—An organization, state-wide in scope, which likely will be called the Commercial Vehicle Owners' Assn. of Indiana, is being formed here and promises to become one of the largest automobile organizations in the state, especially in the capital invested. L. M. Shaw, manager of the Indiana Automotive Trade Assn., has been selected chairman of the organization. The main function will be to secure favorable legislation for commercial vehicle owners and to obstruct and defeat such legislation as will be inimical to the interests of the truck owners as a whole.

At a recent meeting of the organization the support of the following organizations in the state was assured: Indianapolis Coal Dealers' Assn., Indiana Sand and Gravel Producers' Assn., Indianapolis Retail Grocers' Assn., Indiana Automotive Trade Assn., Indianapolis Transfer Assn., Master Plumbers' Assn., Indianapolis Automobile Trade Assn., Indianapolis Wholesale Grocers' Assn., Indiana Transfer and Warehousemen's Assn., Indiana Association of Electrical Contractors, Indianapolis Commercial Warehousemen, Indiana Bakers' Assn., Portland Cement Assn., Indiana Highway Transport & Terminal Assn., and the Indianapolis Ice Dealers' Assn.

As the organization grows it is planned to take in as members similar organizations throughout the state. One of the main purposes at the present time will be to urge passage of legislation that will create more improved streets and more good highways throughout every city and county in the state.

SHOW SPACE GOING FAST

Indianapolis, Aug. 15—More than seventy-five per cent of the available space for the twenty-third semi-annual automobile show to be held here the week of Sept. 5 has been taken, according to John B. Orman, manager of the Indianapolis Automobile Trade Assn., who has had charge of staging the shows for years.

"The way the dealers are taking space does not jibe with their pessimistic talk about business," declared Mr. Orman today. "A large percentage of the dealers are asking for more space than they ever took before. The automobile show is one of the ways I get a line on how business actually is. If business has been good they hurry to subscribe for space and if it has been poor, they cut down their requirements and wait until the last minute. This year not only the requirements have been greater per dealer, but the space is virtually gone and it is a month until time for the show. They can't tell me about poor business any more."

Sheridan Car in Control of Durant Since August 1

Virtually Nothing of Old Design to Be Retained; Even Name Has Been Changed

NEW YORK, Aug. 15—The plant of the Sheridan Motor Car Co. at Muncie, Ind., was taken over on Aug. 1 by the Durant Motors Co. of Indianapolis, a $3,000,000 corporation of which D. A. Burke is president and general manager. Only the plant itself was purchased and the new owners did not acquire the inventory which had been assembled by the General Motors Corp. for the Sheridan car.

Production of the Sheridan, which will be rechristened the Durant Six, will not begin for a month or more under the new ownership. The models are being redesigned and rebuilt at the Long Island City plant. They will retain practically nothing of the old Sheridan. The Durant motor will be used and all the principles of design embodied in the Durant Four will be included in the Six. One of the main features will be the accessibility of the various parts and another will be the strength of the chassis.

Hood Will Be Lengthened

The general body lines designed by Burke will be retained except that the hood will be lengthened eight inches. When Burke designed the Sheridan he worked out an idea he long had cherished of building a luxurious car with many of the refinements found in higher priced cars, which would sell at a moderate price. He sold this idea to Durant and the result was the establishment of the Sheridan division of General Motors. This idea will be retained by the new company but the car which will be turned out will be much more powerful than the one which was built up to Aug. 1.

The prices of the various models of the Durant Six will be: roadster, $1,600; touring car, $1,650; coupe, $2,250, and the sedan, $2,400.

The sedan model of the Durant Four now is ready for production and will sell at $1,365. The coupe will sell at the same price, but a few changes are to be made in the body lines.

ATLANTA SALES HOLDING UP

Atlanta, Ga., Aug. 13—While it is rather early in the month to present any accurate figure that might forecast automotive sales in the Atlanta territory for August, if registration figures at the state capitol building are any kind of a barometer of sales conditions, the August total of retail sales in Atlanta will be up to that of any previous month this year. During the first week of August there was an average of about 70 licenses issued daily, this including new and used pleasure cars and trucks. The trucks are greatly in the minority, while about half of the motor car sales are of new cars. No re-registration is required in Georgia and therefore all of these are bona fire sales, this report covering retail trade in Atlanta only.

As many of these sales were made during July, the buyers waiting until after July 31 to secure their licenses, total sales for the past five weeks have been in the neighborhood of 700 new and used motor cars and trucks.

There has been a sudden and substantial increase in the price of cotton because of the government's report on the low condition of this year's crop, and as a result automotive sales in the rural districts and smaller communities are expected to experience considerable stimulus within the next few weeks. Cotton went up about two cents per pound the first week of August, the increase meaning millions of dollars to Southern farmers.

Car Sales in Carolinas Follow Boom in Cotton

Charlotte, N. C., Aug. 13—The motor car demand in this section is improving. Coddington's special train has just made another trip from the Buick factory, bringing this time 201 automobiles of different types, and other distributors are also bringing them in about as fast as they can get them.

The Anderson Motor Co., Rock Hill, reports an improvement in business, their dealers now placing good-sized orders for their product. Charles R. Shanks, vice president of the company, is of the opinion that recent favorable action by the Federal Reserve Board towards relieving the cotton situation in the south is one of the principal factors in bringing about this improved condition. Another factor, says Mr. Shanks, is the realization on the part of car buyers that the limit of low price levels has been reached and that in all probability the next change in price will be upward.

The Anderson plant at Rock Hill, which had been operating on half time during recent weeks, is now going ahead on full time. The company has recently made improvements in its cars and added two new models, and these are contributing factors to the plant's activity.

CHALLENGER LINES REDUCED

Detroit, Aug. 15—The Columbia Motors Co. will reduce the prices of both the regular and Challenger lines, reduction effective August 15. Following are the old and new prices:

	New Price	Old Price
De luxe touring, 5-pass.	$1475	$1795
Roadster, 2-pass	1475	1795
Roadster, 2-pass	1475	1795
Coupe, 4-pass.	2295	2495
Sedan, 5-pass	2350	2595
Challenger touring, 5-pass.	1195	1495
Challenger coupe, 4-pass.	1995	.....
Challenger sedan, 5-pass.	1995	.....

The general specifications and standard manufactured units remain exactly as before in both the models, but refinements and changes in general appearance have been made in the bodies and the equipment has been changed slightly.

Asks Buckeye Governor to Aid in Truck Law Repeal

Wants Executive to Make Amendment to Burke Law Order of Business in Special Session

CLEVELAND, Aug. 15—A committee of five representing every phase of the motor truck industry in Ohio went to Columbus Aug. 9 and asked Gov. Harry L. Davis to provide means for permitting the Burke law limiting the weight of motor trucks to be amended at the special session of the general assembly, which will be held next January.

The committee also discussed with Gov. Davis plans for the filing in court of a friendly suit to test the constitutionality of the law, which becomes effective September 5. The governor was told that the Ohio truck industry and users of the same were done a great injustice when the bill was passed, and they hope to work out a plan of action with him whereby an early amendment of the law may be made, and operation of the law deferred until it is changed. Members of the committee are: P. A. Lewis, Springfield, of the Springfield-Kelley truck; W. W. Williams, Columbus, representing dealers; W. C. Freelock, of the Liberty Cartage Co., Cleveland, representing users of trucks; H. A. Waddle, of the Goodrich Tire & Rubber Co., representing tire manufacturers, and J. S. Schindle, of the Tellings-Belle Vernon Co., Cleveland, representing business users of trucks. Mr. Lewis is chairman of the committee, which was named by T. R. Dahl, secretary of the White company, at a recent meeting in this city.

Transportation Costs to Be Increased

The committee informed the governor that if the bill becomes a law these things will happen to the truck industry, users of the vehicles and consumers: approximately 15,000, 5 and 7-ton trucks will be eliminated as a transportation medium; $2,000,000 worth of trucks will have to be scrapped; transportation costs will be increased $5,000,000 because of the larger number of trucks required to haul traffic now handled and the increased number of employes; milk companies will have to pay one cent a gallon more for transporting that product to the cities and consumers and producers generally will have a new load put on their shoulders.

Under the Burke bill loads allowed on highways are reduced to 20,000 lbs. including the truck; weight per inch tire width is reduced from 850 lbs. to 650 for pneumatic tires. Steel tired vehicles are allowed to carry 24,000 lbs., and the truck people say this is ridiculous as the steel tired vehicle is harder on improved roads than is the other class of vehicles. When the governor issues his call for the special session of the legislature, the committee asked the governor to set forth amendment of the Burke bill as an order of business.

90 Per Cent Duty to Keep Motor Trucks in Europe

Graham Resolution Seems Sure of Passage Before Tariff Law Is Effective

WASHINGTON, Aug. 15 — Favorable action is expected in the House on the revised Graham resolution, which has been reported by the House Committee on Ways and Means. The new measure provides for the imposition of a 90 per cent tax on all surplus war materials which have been sold abroad and reimported into this country. The bill is designed to prohibit the flood of used army motor trucks into the markets of this country.

The original bill as introduced by Congressman Graham, of Illinois, provides a 300 per cent assessment at customs, but he changed the rate to 90 per cent after consultations with members of the committee. The new bill is expected to prove as effective as the original, inasmuch as the imposition of a 90 per cent tax is sufficient to prohibit the unfair competition of underselling legitimate American motor truck dealers. The bill has a privileged status and will undoubtedly be passed this week. The committee's action is based upon the knowledge that some ad interim legislation is necessary at this time to stop the increase in reimportation of war supplies.

The Fordney bill which recently passed the House, carried a specific provision levying heavy rates on reimported material, but owing to the fact that the tariff bill will be delayed in the Senate, Congressman Graham offered the resolution. If this measure is passed by the Senate and signed by the President, it will bring to an end several months of consistent agitation in behalf of motor truck dealers. The ordinary protests were filed from Los Angeles dealers' organizations where rebuilt cars were offered for sale at prices which could not be met by regular dealers.

90 FIRMS MAKE 203,000 TRACTORS

Washington, Aug. 15—Production statistics of farm implements as compiled by the Bureau of Public Roads, United States Department of Agriculture, show that there were 203,000 gas tractors manufactured during the year 1920, with a value of $193,000,000. These figures represent the output of 90 firms and 162,988 tractors with a domestic sales value of $161,896,000, while 29,143 were foreign sales valued at $30,850,000.

COLONEL DEALERS THUMP MELLON

Louisville, Aug. 12—Interests of automotive dealers and owners regarding legislation are identical in the opinion of members of the Louisville Automobile Dealers' Assn., who point out that adverse legislation against owners of motor vehicles concerns the dealer more than any other class of legislation. The nation-wide protest that is being made against the tax of $10 on each motor vehicle, as outlined in Secretary Mellon's proposals to Congress, finds reflection among the dealers of Louisville and other cities of Kentucky and southern Indiana. Directors of the local organization who met yesterday expressed strong disapproval of the measure and decried this newest effort to "saddle" a still heavier load on the industry.

PRACTICAL TIRE MERCHANDISING AND REPAIRING

(*Concluded from page 19*)

mandrels for holding tires that are being cut down or built up. These are of standard construction and can be obtained from any one of a dozen or more manufacturers. They should be attached to the bench in such a way that they can be removed because there will be times when the workman will want to get them out of his way.

Small tools for the bench should include concave and convex stitchers for rolling down fabric or tread stock; beaded stitchers for rolling down fabric and also for use in making tube repairs; several pairs of heavy shears for cutting fabric and rubber stock; a couple of one and two-ply fabric knives and a couple of rubber knives; a couple of brad-awls for puncturing; tread and cushion stock to release imprisoned air; heavy pliers for pulling treads and tearing out fabric; small sharp-nosed pliers for tube repair-work, and a couple of good stiff wire scratch brushes for roughing up small tube repair jobs and tread cuts, etc.

From time to time this list will be added to as the requirements of the shop become better known. The tools mentioned are only those that are really necessary to start.

TUBE DEFLATOR AND VALVE TOOL

One device that is desirable although not entirely necessary is a tube deflator, which may be attached either to the bench or on some convenient wall space. If any considerable amount of tube repairing is done such a device will pay for itself very quickly in time saved.

Another device that will be found valuable is a valve tool for removing or tightening the nuts on valve stems. This tool will take off even the most obstinate nuts in a fraction of the time necessary in the use of a wrench.

Fabric skivers, tread pullers, tread rollers and devices of this character are excellent if there is enough work to keep busy. None is absolutely necessary. These are tools that are used only in the larger shops where repairing of every character is done, including retreading either by the sectional process or in a retreading kettle.

In next week's article Mr. McMinn will cover the following points: How to Test Tubes; Perfect Cleanliness Is Essential; Benzol Is Best Cleaning Agent; Simplest and Quickest Way.

In future articles he will discuss: Regular System of Inspection; How to Detect Rim Cutting; What Sand Blisters Indicate; Watch for Fabric Separation.

I. H. C. Motor Truck Plant Construction Is Delayed

Work On the Monster Factory Will Not Be Started Before Next Spring

FORT WAYNE, Aug. 15—That construction work on the big motor truck plant of the International Harvester Co. in this city will not be started until next spring is certain as the result of a further extension of eight months being given to the concern in which to start work. This extension has been granted by the Greater Fort Wayne Development Corp., which has a contract with the Harvester company for the building of the local plant and for the improving of the property near the plant.

That the plant will be developed eventually according to the original plans is assured in the following statement from the company:

"In requesting this further extension we desire to assure the Development company and all concerned that our company has never entertained for a moment any doubt of ultimate execution of the contract referred to or of the carrying out of its plans for the development of a Fort Wayne plant as heretofore declared to you. With us the question is solely one of time. Our reason for asking this further extension is to be found as before in the present and prospective conditions of our business, of finance and of building costs."

As further evidence of good faith on its part and acting upon their request, arrangements have been made with the officers of the International Harvester Co. whereby the corporation will pay the Development company interest on the money the corporation has collected and invested since March 25, 1921, until the time building operations on the new plant are begun.

Material costing thousands of dollars is on the site of the plant ready for the starting of work.

REDUCE PER HOUR CHARGES

Kalamazoo, Aug. 15—Two leading garages in this city announce a reduction of per hour work to customers from $1.25 to $1. This has been effected without any reduction in wages, simply by a readjustment in working conditions. A similar reduction is also announced at Battle Creek. Those concerns that have made the concessions report a great increase in business during the past fortnight.

DOES NOT INCLUDE MID-WEST

Indianapolis, Aug. 13—Officials of the newly organized Haynes Tractor Co. and allied interests here denied the rumor that they were contemplating taking over the Mid-West Engine Co. of this city. Both Elwood Haynes and A. G. Sieberling declared the report was untrue. The new Haynes company took over the Tractor Co. of Indianapolis, and the Powell Tractor Co., of Elwood, and was incorporated at Indianapolis, recently.

Creditors Ask Early Sale of Standard Parts Company

Clevelanders Think Certain Group Seeks Control of $20,000,000 Corporation; No Decision

CLEVELAND, Aug. 13—Creditors of the Standard Parts Co. met here Aug. 9 and voted to ask Federal Judge D. C. Westenhaver to grant an order for the immediate sale of the property of the $20,000,000 corporation which is engaged in making automobile accessories and parts. Judge Westenhaver appointed receivers for the corporation last September upon application of the stockholders.

An all-day discussion preceded the action of the creditors and at times the debate grew stormy. P. A. Connelly, secretary of the company, testified that when the Standard Parts Co. was formed the capital of the corporations entering the combine was written up to the extent of $5,156,000. Since the merger was formed, he said, it had lost $8,094,000. He also attacked the inventory filed with the court, the figures of which were prepared by expert accountants.

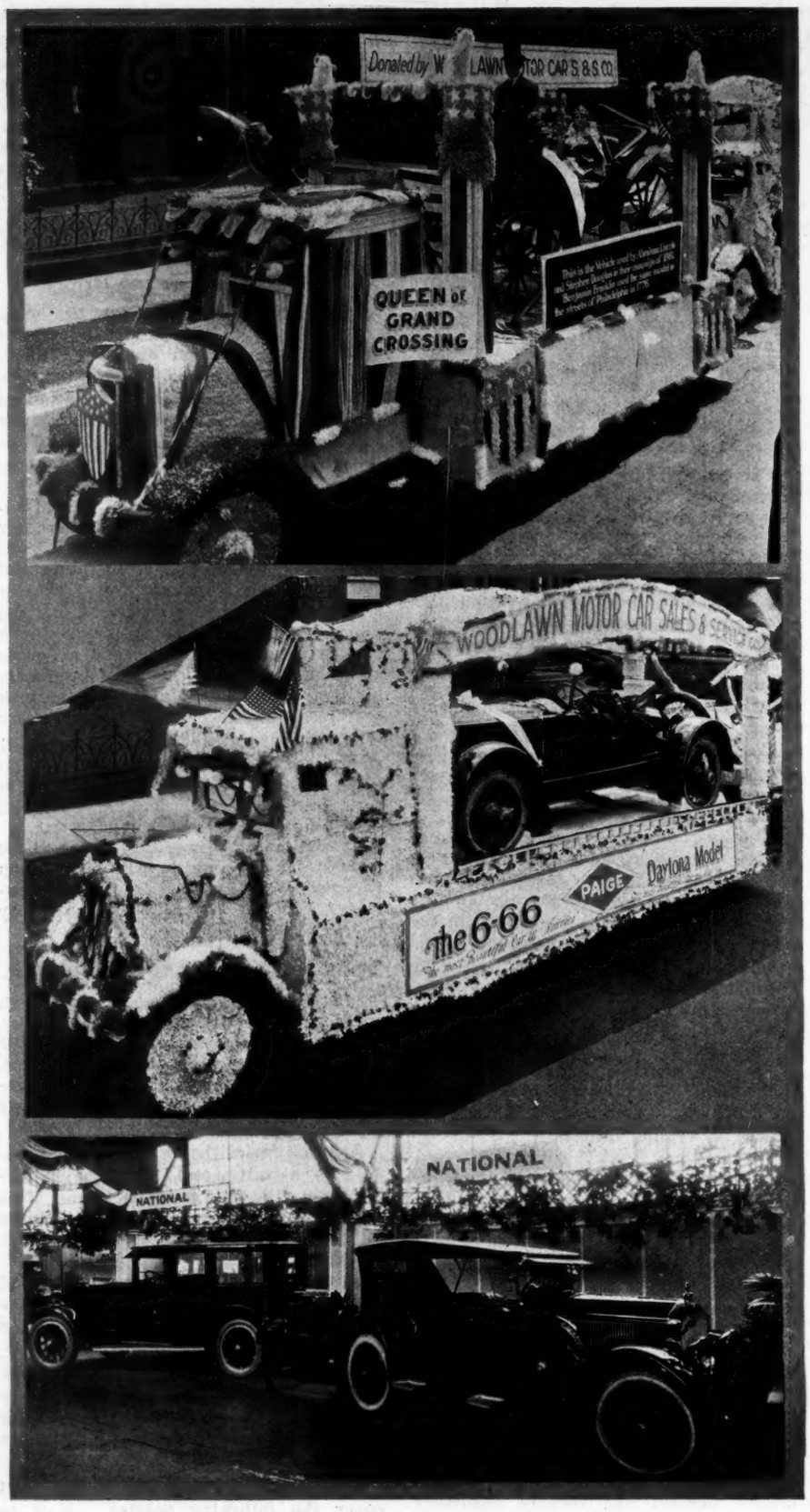
Connelly said that the inventory should be reduced and he contended that the assets were in reality but $1,000,000 in excess of debts. Attorney A. V. Cannon, who represents the receiver, Frank Scott, asserted that the inventory was correct, and that the assets of the company amounted to approximately $18,000,000. He said that after paying all debts the preferred stockholders would have left 100 per cent equity in the company.

Creditors Would Have Control

The creditors have a plan for the sale of the property under which they would bid in the plant, form a new company and offer stock in it to the stockholders of the present corporation. Those not purchasing would lose all they had invested. The creditors would have control of the new corporation.

Judge Westenhaver took under advisement the appeal to the creditors and he did not give his opinion on the petition of the receiver for an order to pay creditors a dividend of 10 per cent on their claims.

Action likewise was postponed by the court on the request of the stockholders that the receiver be continued for the present. Clevelanders who have been following the corporation's affairs see a hard fight being made for control by a certain group. A majority of the stockholders profess to be satisfied with the showing of the receivers who have been making money for them in the last few months. They hold that if the corporation is dissolved and the plants are sold they stand to lose. They are fighting hard to convince the court that if the present management continues, with good fall business ahead, the company will be strengthened financially.



Chicago Dealers Stage Elaborate Parade

Dealers in Chicago injected a strong element of confidence into local conditions when they took prominent part in the Pageant of Progress, the big industrial exposition which ran for two weeks on the Municipal Pier. Many of the local dealers were represented in the show, both in the parade and in the automotive section of the exhibition. Paige and National displays are shown above

Conditions Everywhere Inspire Industry With Confidence

Many Manufacturers, Under-Estimating Demand, Placed Schedules Too Low and Are Now Short on Production; Parts Makers Are Speeding Up

NEW YORK, Aug. 15—As the summer progresses the outlook for the automotive industry becomes increasingly encouraging. This applies not only to present but to future business. Manufacturers are not finding it necessary to curtail production schedules as sharply as had been expected and a considerable number of them have not reduced their output from the July schedules. Several companies are not able to keep pace with orders and their dealers are considerably behind on deliveries. Where it is not possible to meet the calls of all dealers, those coming from the agricultural districts, which were flat for many months, are met first.

It has become apparent that there is no dearth of purchasing power for automobiles either in the United States or other countries. The response which followed price reductions has amazed car manufacturers. They expected some stimulus to business but nothing like what has followed. This is the reason why some of the more popular lines are behind in deliveries. They under-estimated demand.

Reports from various parts of the United States are that August automobile sales promise to equal or eclipse those of July. A prediction to this effect would have been considered chimerical a month ago. Business is distinctly better in the agricultural sections and in the south. Crops are being harvested and the price of cotton has advanced. This promises well for the months to come when the harvest is completed.

Employment Increases in Detroit

It is known that reports received by the General Motors Corp. for the first week of August indicate that business for this month will exceed that of July. With cars in various price classes, this condition can be considered fairly representative of the industry. It is true of Dodge, Studebaker, Reo, Hupmobile and Ford. In fact, steady gains in employment are being made in Detroit. For the week ended Aug. 2, the manufacturers there employed 1,231 more men than the week before. Men are being taken on not only in the car factories but in the parts plants.

Five Cleveland companies — White, Chandler, Cleveland, Jordan and Templar report larger production schedules. Winton, Peerless, Stearns and Grant say that their output is being maintained at the rate reached in June and July. White is selling more trucks than it is making.

Not only are car manufacturers finding August business beyond their expectations, but there are gratifying signs of life in the truck industry. With the general improvement in business and the consequent increase in freight movements, there has been a substantial increase in truck orders, although they still are far below normal. Truck sales will move upward early as the general movement of goods expands in volume.

As the need for motor transport increases, sales of new commercial vehicles probably will be retarded until the stocks of American-made trucks reimported from England and France are liquidated but the number of such vehicles is not large enough to last long once business reaches anything like normal proportions. By that time it is probable Congressional action will have curbed reimportations.

Truck Industry in Its Infancy

Close observers of conditions are more firmly convinced than ever that the truck industry really is in its infancy and that its expansion in the next few years will parallel that of passenger car development in the past decade. In spite of depression there has been a surprising development in motor freight and passenger lines. In the passenger carrying end of this business the United States is lagging far behind Europe.

With the production of motor vehicles holding up surprisingly well, parts makers are beginning to feel the reflex, and the prospect for fall business is much brighter than it was two months or even a month ago. This is especially true of makers of unit parts. Probably the most encouraging feature of the situation is that both car makers and parts manufacturers have made very heavy reductions in the enormous inventories they had on hand when the slump came last year. This will necessitate soon a larger volume of orders from the vehicle factories and will send the parts companies into the market for materials.

Another trend of the industry which is arousing much interest and speculation is the demand for enclosed bodies. Indications now are that most companies will be flooded with orders for enclosed models in the next few months. The various plants of the Fisher Body Corp. have so much enclosed work booked that they can accept no more orders.

A dispatch to MOTOR AGE from its Cleveland correspondent says:

"Cleveland body companies, especially those making enclosed bodies, are gradually swinging towards normal production. Within the last 30 days orders have been booked in much larger numbers. A further increase is expected after Sept. 1, and there is every indication that business will continue good throughout the winter. Demand as a rule is far ahead of the pre-war record and in some cases it is running close to the record-breaking figures of 1920."

With business surprisingly good for midsummer there is every reason to believe it will improve steadily as the year advances. Encouraging factors are coming more and more to the front. Railroad earnings are steadily climbing because of the larger freight tonnage. The crop movement at this time of the year is seasonal, but more freight cars are being used for the movement of general freight. The improvement noted in steel orders for the past three weeks is holding its own.

Business to Improve Steadily

Harvesting is being done this year unusually early and farmers are eager to get their crops to market. The wheat harvest has stimulated business generally throughout the Kansas City district. The yield was larger than anticipated and a big corn crop is virtually assured. Wholesalers of various lines of merchandise report an increased demand, indicating that the farmers are coming into the market.

The northwest, all the way to the Pacific Coast, has been pretty thoroughly deflated and the worst is over in that section. While business will not return to normal for several months, the trend will be gradually upward and there are signs that the turn has begun already.

A distinctly better feeling is apparent in the south with some degree of stabilization in the cotton market.

Altogether, the outlook for the automotive industry is growing brighter day by day. Apparently it is going to escape the worst of the usual seasonal slump.

Concerning Men You Know

W. J. Drumpelmann, recently resigned as assistant sales manager of Hudson-Essex, has been elected vice-president and director of sales of Saxon Motor Car Corp., succeeding C. H. Page, resigned.

Moses D. Newald, head of the M. D. Newald Co., Milwaukee, Wis., state distributor of the Stewart truck, and vice-president of the Milwaukee Automotive Dealers' Assn. as representative of the truck industry, died Aug. 3 after a brief illness, at the age of 61 years. Mr. Newald was a 32d degree Mason and Mystic Shriner.

D. H. Roberts, sales manager of the Latox Tire & Rubber Co., Fond du Lac, Wis., resigned Aug. 1 to accept a similar position with the Sangamon Rubber Co., Springfield, Ill., which formerly was known as the Wilson Tire & Rubber Co. Mr. Roberts is succeeded in the Latex organization by Harry Benner, who was assistant sales manager.

B. Edwin Hutchinson, for the past four years treasurer of the American Writing Paper Co., Holyoke, Mass., has resigned to assume a similar position with the Maxwell Motor Company, Inc., and the Chalmers Motor Corp., Detroit.

Guy W. Vaughan, who has been with the Van Blerck Motor Co., Monroe, Mich., for the past two years, being vice president and general manager, has resigned as general manager to go as vice president and general manager of the Standard Steel & Bearings Co., of Philadelphia.

Joseph C. de Varona has been appointed special representative for the Maxwell Motor Corp. Mr. de Varona has been with the General Motors Co. for the past five years.

H. M. Schwarze, electrical engineer with Cadillac, has resigned to join Collin's engineering staff with Durant Motors.

Verne E. Burnett has been appointed advertising manager for Cadillac after resigning from a similar position with Liberty Motors.

Fred E. Castle, of the Fred E. Castle Co., Detroit, announces the termination, by agreement, of his contract with the Hayes Wheel Co., Jackson, Mich. Castle is known to the entire industry as one of the veteran sales representatives in the motor car equipment and accessory field.

James J. Hunt, vice president and general manager of the Reo Motor Car Co., of New York, has tendered his resignation, effective Sept. 1. Hunt has not been in the best of health lately and plans to take an extended vacation before entering active business again. He has been with Reo in the New York territory since 1915.

W. Ross Walton, for fifteen years Philadelphia branch manager for the Firestone Tire & Rubber Co., has been appointed distributor for the Oldfield Tire Co. for Philadelphia and adjacent territory.

Harry W. Anderson has been appointed general sales manager of the Duesenberg Automobile & Motors Co. Mr. Anderson is known in the industry as the man who built the first motorized high wheel buggy. That was in November of 1898. For years he was associated with the American Motors Co., builders of the "American Underslung," a 4-cylinder car. He was general sales manager of the Stutz Motor Car Co., and, until his connection with the Duesenberg corporation, general sales manager of the Templars Motors Co.

Roy Davey, manager of the Detroit branch of the Bosch Magneto Co., has been made manager of the manufacturers' trade department at the factory at Springfield. Davey was formerly advertising manager of Chalmers and sales manager of Bethlehem Motors Corp.

Mason B. McLaughlin, Cleveland, who has been manager of the central sales department of the White Co. for a number of years, has been promoted to a vice-presidency of the corporation. Robert A. Woodruff, manager of the southeastern department of the company, was also named a vice president. Mr. McLaughlin and Mr. Woodruff, with Vice Presidents James A. Harris and George F. Russell, will have headquarters at the general offices in Cleveland, where they will direct sales all over the world. They are to compose a sales committee, a new body that has been established.

D. W. Weigel has assumed the management of the Lehigh Tire & Rubber Co., formerly the New Castle Rubber Co., recently purchased at receiver's sale by F. A. Seiberling. It is proposed to make about 500 tubes a day.

Take Measure of Country's Thrift at County Fairs

Fort Wayne, Aug. 13—The county fair season has started in this part of Indiana with the Northern Indiana Fair at Decatur, which had attendance records up to those of last year. With the county fair time at hand it is possible to take a survey of the local agricultural conditions and see how the condition of the farmers affects the automotive outlook in northeastern Indiana. The crops in Allen county, which is by far the best agricultural county in the state, have been good this year but on the whole have not been up to last year in yield and, of course, are not bringing anywhere near the prices which last year's crops brought.

The wheat yield was up to the average, but the oats crop was comparatively low, and the long hot spell killed the major portion of the potato crop. Timothy hay and clover were just as good as ever. Corn was looking good in spite of the long dry spell until within the last week or so when a heavy wind storm blew a lot of it down. However, it is not thought the crop will be much damaged as the ears were pretty well along.

The main objections of the farmers are based on the fact that they cannot make any money at the present farm product prices. One man with 800 acres says he will only break even this year. Other farmers say they are losing money and some of them have quit farming and come to the city to try and look for jobs. But, of course, the great majority of the farmers, while discouraged at the low prices for products, are still going along as ever.

With farm receipts much lower this year than last it looks as though the farmers in this section will have to curtail purchases during the next few months, particularly on tractors which they can get along without. Many of them will probably make their old automobiles do another year instead of purchasing new ones.

Columbia's Club Suggests Promising Plan to Makers

Detroit, Aug. 12—For the first time since the Columbia Motors Co. acquired its beautiful club house on the shores of Lake St. Clair, 10 miles outside of Detroit, a convention of its dealers was held there on Wednesday, July 27. Distributors and dealers from all sections of the country were in attendance in response to a call from President J. G. Bayerline. The purpose of the meeting was not made known until the distributors arrived at the club, where they were informed of the facts about the company's 1922 line at prices on a pre-war basis.

The trade perhaps will be interested in the Columbia Country Club and what was done there. In the first place, the club house and grounds are very beautiful. The building is a spacious mansion set in a landscape of rare beauty, with the lake stretching away for miles.

Here will be held all the future conventions of the company and other factory meetings. The Champion Spark Plug Co. recently had its men there at their annual convention. And every two weeks the Columbia factory officials hold a "better car" meeting at which every suggestion bearing on the betterment of the product is discussed.

This method of factory cooperative work is the idea of Mr. Bayerline, president, who is a firm believer in getting everybody interested in his work. And it is a notable fact that some of the most valuable suggestions come from men not always classed as thinkers. But the club meetings prove that many are thinkers, and have excellent ideas.

Golden Gate Is Preparing to Construct New Speedway

San Francisco, Aug. 12—The erection of a motor speedway in San Francisco in the near future is announced by the San Francisco Motor Car Dealers' Assn., which has named William L. Hughson chairman of its racing committee. Hughson is now on an inspection tour of the Cotati (Calif.) and Tacoma racing bowls, gathering data for embodiment in the bowl to be constructed here. Mr. Hughson also recently visited several speedways in the east. Location for the new bowl here has not been selected, but it probably will be in one of the suburbs. It is generally understood that the financing of the project is virtually arranged.

OPEN AIR MARKET FOR USED CARS

(*Concluded from Page 20*)

ment, repairshops and service stations near at hand. The prospective purchaser of a used car is allowed to take it out for trial, even to keep it for two or three days, leaving his own used car, or some other security for it. In other words, the open-air market has become a clearing house for used cars, and ideas and improvements as well. Many of the dealers in new cars have noted a steady falling off in the offerings of used cars, and an increase in the number of persons, known to have possessed cars recently, who are offering first payments in cash, rather than turning in their used cars, which apparently, have been sold for cash in the open-air used-car markets of the city. Needless to say, the idea meets with the approval of the new-car dealers to a great extent, though some of these dealers, especially in San Francisco, are of the opinion that the open-air markets reduce the sales of new cars by persuading the motorist to be contented with a better grade of used car, at least until the period of business depression incidental to the summer has passed.

Automotive Repair Shop
Practical Maintenance Hints

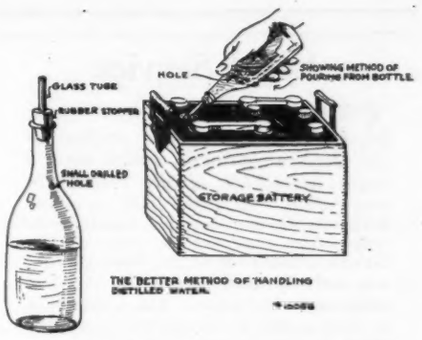
Lifting and Turning Bar for Ford Engine

When overhauling Ford engines the bar shown in the accompanying illustration can be used advantageously to lift the end of the engine about and to turn it over where the crankshaft or connecting rod bearings have been fitted up tight. The bar is made fron an old Ford driveshaft or similar shaft about four feet long. Each end of the bar is forged square to an exact fit in the universal joint socket behind the transmission.

Eight inches from one end a sharp right angle is made in the bar, which end is used to turn the engine over, the long arm affording an excellent leverage to pull against the tight bearings. With the straight end inserted in the socket, one man at the end of the bar can readily lift the end of the motor and swing it around on the bench without cutting or crushing his fingers. Avoid using a wrench or bar between the open spaces at the magnets on the flywheel as the small fastener holding the magnets are certain to be bent or broken, necessitating extensive work to repair. Make up one of these bars and it will rapidly prove an indispensable piece of equipment.

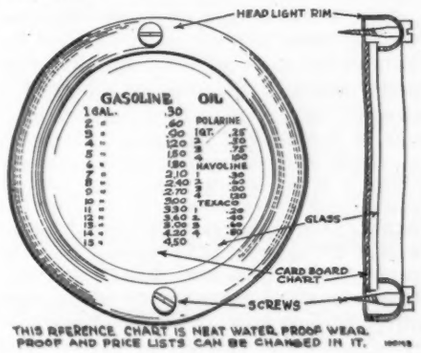
A Better Method of Handling Distilled Water

While many methods have been devised for pouring distilled water into storage batteries without overflowing or filling the cell beyond the desired height, the wide-awake battery dealer uses the simple bottle with air control as is shown in the illustration. The bottle is simply a circular pint or quart glass bottle with a rubber cork and a small glass tube in the mouth. About 2 inches below the neck a sixteenth or an eighth inch hole is drilled through.



Glass bottle with air control feature for battery filling purposes

To pour, the bottle is simply inverted, and to stop the flow or control it, the thumb is placed over the hole. It is obvious the liquid will not flow through the small tube without being replaced by air. To drill the hole in the glass, use a breast drill with a steel cutting bit and lubricate the drill point with turpentine. The hole can be cut through in a few minutes. As a simple means of handling the distilled water this has several advantageous features over other methods.



Waterproof reference chart made from front of headlight

Removing Tight Bolts or Spark Plugs

An expedient which works well in the removal of stuck spark plugs or in loosening tight bolts consists in placing two wrenches on the part instead of one and pulling jointly on the two. Where sufficient pressure can be obtained on one wrench with the aid of a pipe extension, however, the jaws of the wrench will invariably spread or the edges of the hex round up allowing wrench to slip. Using two wrenches on different faces of the part these distribute the pressure and the bolt or plug is loosened without springing the wrenches or rounding the bolt head.

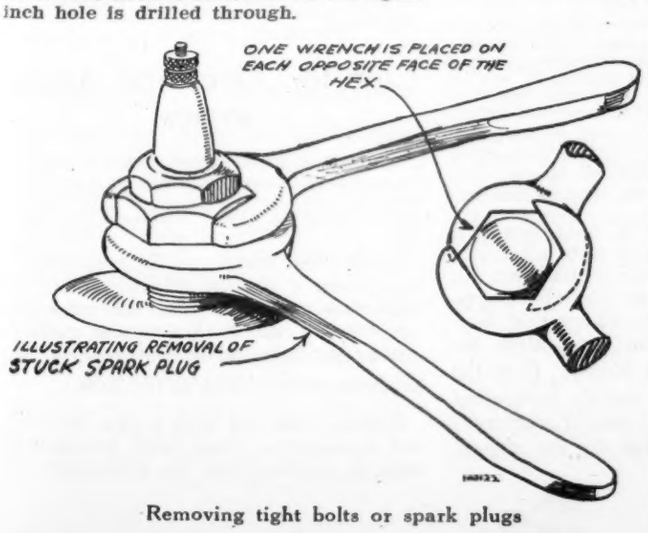
Reference Chart Made from Front of Headlight

A reference chart used by a gasoline filling station, giving the prices of various quantities of gasoline and oil, consists of a paper price list covered by a metal rim and a circular glass front, which formerly served as a headlight cover. This simple conversion of an otherwise discarded part resulted in a serviceable water-proof and wear-proof chart.

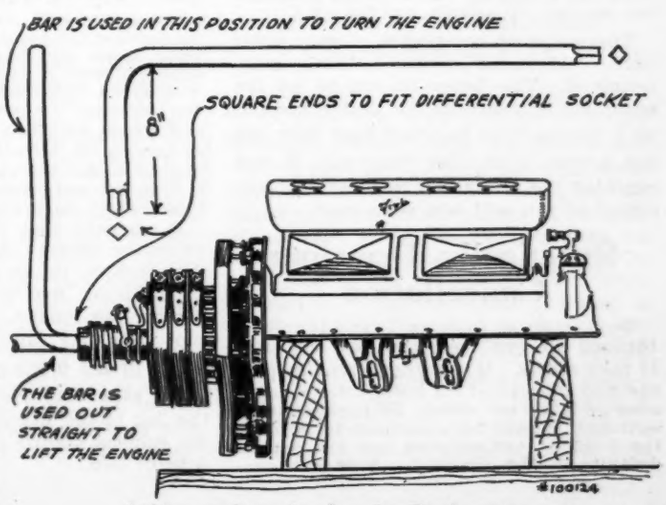
The rim was painted neatly and held by two screws at the edge, permitting changing of the chart as the price of oil products changes.

Cooperation

Cooperation is the keynote of the automotive industry this year and will become more important as time goes on. MOTOR AGE is pleased to extend an invitation to its readers, wherever they may be, to contribute short articles and sketches on easy or improved ways of doing hard things, which they may have worked out and thus lend their aid in helping the other fellow.



Removing tight bolts or spark plugs


BAR IS USED IN THIS POSITION TO TURN THE ENGINE
SQUARE ENDS TO FIT DIFFERENTIAL SOCKET
8"
THE BAR IS USED OUT STRAIGHT TO LIFT THE ENGINE

Lifting and turning bar for Ford engine

Legal Problems

Conducted by Wellington Gustin

Owner Disappears—Collection Problem

Q—Last March a Chalmers car was left with us for repairs and the owner stated that he would be back in a few days. Three days later we received a letter with instructions not to do any repair work on his car. The work had been performed on this car a day before the letter was received. Since then we have written the owner asking him to get his car, but our letters are being returned with "Unclaimed" stamped across the face. The postmaster has no record of his address and is unable to locate him. What method shall we use in order to get our money for our service, material and storage on this car?—Lesmeister Electric Shop, Harvey, N. Dak.

A—You have two good available remedies in North Dakota to get your money. You may bring suit for the amount due and get service on the party by publication, then levy on the car and have it sold by the sheriff or constable to satisfy your judgment.

Or, you may foreclose your lien on the car. This is foreclosed in the same manner as mortgages on personal property. Perhaps the foreclosure proceeding would be best in your case, as you might be able to get quicker action with less expense. However, that is a question dependent on your courts.

Order for Shipment Never Accepted

Q—Some time ago I gave a manufacturer an order for a number of cars. At that time the factory was behind on orders. It wrote me that it could not make promises as to delivery, but that if I would let the order lay in abeyance until the next month it would be in a better position to advise what it would be able to do in reference to the order. Later I decided I could not use the shipment due to sudden slump in business, and notified th factory not to ship but it proceded to ship and brought suit against me. What are my prospects of winning this case? With the slump in business the distributor sought to unload on me.

There was no acceptance of your order here. "Abeyance" means a being undetermined. The letter to you to let the order lay in abeyance for action upon it at a future time is proof that they did not accept it at that time, and if you canceled the order before they later accepted it you will win your case.

Practically Prevents Cancellation

Q—I sold a customer an automobile through an employee who had authority to take orders. My contracts provide that one may not cancel his order after acceptance of it by me except by agreement in writing. I have been delayed in getting the kind of car ordered but am not in default on the contract. Now the customer has attempted to cancel his order. May I still hold him in law?

A mere proposal to purchase the automobile could be countermanded by the buyer, without creating liability on his part for breach of contract, at any time before you accept the order, unless there was an agreement founded on a consideration of value that there would be no countermand.

Now if you accept the order the contract is made, but the buyer may yet before delivery of the car to him, stop performance of the contract by explicit direction to you, though he subjects himself to payment of damages. However, the right to stop performance does not exist if your contract provides that it could not be cancelled or revoked by either party after acceptance of order except by agreement in writing on your part. Hence you may hold your customer to strict performance of the contract.

Legal Service

SEEMINGLY knotty legal problems are constantly arising in the dealer's business, which even a slight knowledge of the law easily may solve. MOTOR AGE presents here the most common legal problems which confront the dealer. Mr. Gustin, a member of the Chicago bar, not only is well versed in the law relating to the dealer, but presents it in such a way as to be readily understood by the layman. In addition to his articles, Mr. Gustin will gladly answer such individual inquiries on knotty points as may be submitted to him.

Lien for Repairs Has Priority

Q—A left his automobile at my garage in Kansas for repairs, and I am holding same under my lien for payment. B has appeared with a chattel mortgage, which was given the dealer to secure him for the balance due on the purchase price, and which was duly recorded in the proper county in Missouri; B has demanded the car under the chattel mortgage. Can I hold the car under my lien as against this chattel mortgage?

It appears that the Kansas lien law gives the citizens of that state a priority for repairs to an automobile over all other liens. See Willys-Overland Co. vs. Evans, 180 Pacific, 235. Under this decision you may hold the car against the claim of the mortgage holder. Here the court says that while comity recognizes the lien of the Missouri chattel mortgage, the Kansas statute gives the garageman a prior lien.

No Storage Lien in Nebraska

Q—(A) acquires possession of a building in which there is a tractor in storage, and after six months (B) calls for the purpose of getting his tractor out in the presence of (A's) employee but in the absence of (A) owner of the building. Having succeeded in running the tractor out in the street (A) is called upon to collect the storage after (A's) employee demanded pay for the storage. (B) pays $5 which (A) accepts as part payment, but positively demands the balance paid before tractor is taken home. After considerable argument on the subject (A) still demanding pay before the tractor is taken any further, (B) starts the tractor and drives it home, (A's) two employees using their best efforts to keep (B) from taking it, without getting into a scrap.

Has (A) a right to file a lien on the tractor for storage, or what other redress has he outside of suing as for an ordinary debt?—A. A. Manke, Bloomfield,, Nebr.

Where (A) never willingly gave up possession of the tractor he would have the right to replevin the tractor on the grounds that he has a lien on same, and the right to retain possession until his lien is satisfied. Replevin action only determines who has the present right to the possession of goods. Where one takes by force, unlawfully, a right of action accrues for damages in the wrongful taking.

In Nebraska the statute, in our opinion, does not give the garagekeeper a lien for storage of cars, and therefore, he would have no right to file a lien. If any work was done on the tractor or any repairs furnished, (A) would have a statutory lien, either by retaining possession, or if possession was not retained, as in the instant case, then by filing his claim of lien within 60 days.

If (A) cannot recover possession on claim of lien at common law, then we are of the opinion that he can only sue to recover for his charges against the debtor.

Lien for Tires and Accessories

Q—Can a garage owner file a lien on an automobile for materials such as tires, gas, oil and accessories never paid for by the owner?—J. Hart Getzen, Lakeland, Fla.

Some few states by statute give a repairman a lien on an automobile for materials furnished and for tires and accessories; that is, the lien is made to cover not only labor and repairs, but accessories furnished at the time.

Florida does not give a lien for tires and accessories unless these are used in altering or repairing the automobile.

Better Business
Money-making Ideas

$1000 for An Idea

T. B. McCarty, manager of the E. R. Parker Motor Co., has just instituted a novel contest, offering $1,000 for an idea that will sell the used cars of his company in a given time.

In a page advertisement carried in the Sunday papers of July 24 the plan for giving away the prize of $1,000 was set forth, and since that time has brought hundreds of answers. These are, for the most part, of the usual give-away-something, guessing or lucky-number variety, but a real gem was received in the very first mail after the announcement, according to Mr. McCarty.

This suggestion was received from a man who offered to divide the thousand. He suggested that a salesman be hired to sell each car. Each man was to be assigned a specific car to sell, but when his car was sold he would have the right to sell any other car unsold. The suggestion was that the man selling the highest number of cars would be given $300 of the thousand dollar prize, the second highest $150 and the third $50, in addition to the regular commission on the sales.

It was pointed out that these extra salesmen could be easily procured because of unemployment. The company's regular salesmen would try to sell the second hand cars along with the extra men and as an incentive would be paid an additional 10 per cent commission.

Kelley B. Spencer, automobile dealer, S. S. Riddle, automobile editor of the Birmingham Age-Herald and Julien Schwarz, automobile editor, the Birmingham News, are to act as judges of the contest which closed July 31. The judge will decide upon which of the plans submitted is the best and the company will immediately put it into effect. If the plan sells the company's used cars in their entirety by Sept. 1 they will immediately issue a check for $1,000.

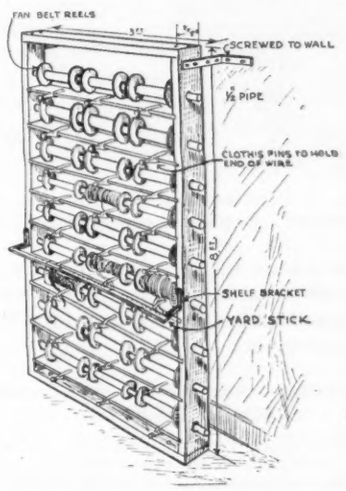
A Car as an Investment

The important point that an automobile is really an investment is made by the Northern Indiana Motor Car Co., of Fort Wayne, Ind., in a recent advertisement which reads as follows:

"MAKING THE AUTOMOBILE A GOOD INVESTMENT.

"Almost any car is intrinsically worth the price, but a car is a good investment only to the extent of its ability to function constantly, smoothly and economically. We feel a personal responsibility for every Studebaker sold in this territory. We know what you expect of it—long service, well-groomed appearance, constant performance. You never fail to realize these expectations here because we have provided merchanical equipment and experienced workmen to assure you continued satisfaction. That is why the purchase of a Studebaker is a good investment. Come and see us."

A dollar will be paid for all ideas accepted as Better Business — Perhaps you have some



Display Rack for Cable Brake Lining

A display rack for holding such articles as flat fan belting, V belting, electric wiring of all kinds, cut-out cables and chains, pump hose, rubber tubing, windshield rubber, gimp binding, hood and body lacing, brake lining, top webbing and in fact numerous other items that usually lay underneath a counter or some out of the way place, is shown herewith.

The reels are easily procurable from any accessory jobber and, in fact, are very easy to make, if necessary.

The strips running underneath the reels are of one-inch lattice with a common clothes pin bolted with a ⅛-in. stove bolt, directly under the reel for holding the ends of the wire. The reels are supported with a ½-in. iron pipe 3 ft. 4 in. long. A yard stick is bolted to the rack within easy reach, and cutting pliers are chained to the rack. Of course the whole outfit is painted and each reel has a ticket with the number, size, price, etc.

Selling "An Ounce of Prevention"

Recently a large car was driven up to the curb in front of a garage in southern Iowa and a workman was called to see why it was overheating. He found that the fan belt was broken. The driver was much alarmed because he feared he had ruined the engine.

While the repair was being made the workman explained the various causes of overheating and the damage that might be done thereby. When the driver asked how to tell when a motor was too hot the salesmechanic explained the advantages of the use of the motormeter.

The result was that when the car drove away 50 cents was rung up on the cash register for the work and $7.50 for the motormeter. Probably about 10 cents profit was secured from the work and at least $2 from the sale. How many dealers have their men instructed to try and sell a motormeter each time a hot engine is brought in for repair?

Club Service on Cars Successful

The Thompson and Heuck service plan of furnishing club service on automobiles is turning out to be more of a success than the firm had anticipated.

The company caused some surprise recently when it agreed to furnish free service within a 20-mile radius of Cincinnati for $1 a month, this service to include delivery of gasoline and oil, free carbureter adjustment, free towing and other small jobs.

The business has grown so rapidly that the company is preparing to open branch service stations in Westwood and Covington and furnish each with a complete set of new equipment.

Making Crankcase Drainings Pay

Many times a repairshop will throw away from five to 25 gals. of crankcase drainings during a day. An Iowa dealer who figured he had been throwing away several hundred gallons each year, decided to make this a source of revenue. He offered a few small prizes to his workmen for the best ideas as to how to make use of the oil. The results were interesting. One workman designed a filter, another suggested selling the oil for hog oilers, another suggested selling it to farmers to kill weeds and trees—and many other ideas were unearthed. The men became so interested that the next year showed a profit of nearly $500 from used oil.

The Readers' Clearing House
Questions & Answers

CONDUCTED BY WM. H. HUNT
Technical Editor, Motor Age

Wiring Dixie Magneto for Battery Connection

Q—We are having trouble with a Dixie magneto model 40 on a 1916 Willys-Knight car. The platinum point on the lever always burns up in 1,500 to 2,000 miles. The screw is never burned much. The condenser seems to be all right, as is also the coil. How could I remedy the trouble?

2—Is it common for Dixie No. 40 to have that trouble, and is there nothing to prevent the points burning?

3—Advise how I could make a battery system out of the magneto by using the breaker and distributer and coil, if possible.—Clarence Greening, Breckenridge, Mich.

1—It is very possible that you have been getting an inferior brand of breaker with but a very thin shell of platinum on the point. These were produced in great profusion during the war and have not all been used up yet. We would recommend that you procure a genuine part, which will probably cure the trouble.

2—No. As a rule, the genuine parts give entirely satisfactory service.

3—Reference to Figs 1 and 2 will make clear the following explanation of how to wire a battery into the magneto circuit. After removing the sheet metal cover of the magneto it will be noticed that there is a small strip of brass connecting the coil to the metal of the apparatus. This is shown in Fig. 1, the connections being indicated by numbers 16 and 22. In Fig. 2 this part of the circuit is indicated at the point marked X.

Procedure: Remove the brass strip and connect one wire from a battery to the small screw at point 22. It will be noted that the switch used with the magneto has the effect of short-circuiting it. For this reason it will be necessary to disconnect the switch as with the battery, one side of which is grounded, connected, the switch in the off position would have the effect of a dead short-circuit.

A simple three point switch such as that shown in Fig. 2 should be substituted. It will be seen that with the lever to the left the battery current passes through the primary winding of the magneto and through the breaker points to the ground and thus returns to the battery. With the switch lever in the right hand position the magneto functions as it was normally designed to do, while the center position of the switch opens all circuits and shuts off the ignition. While it is true that the battery current opposes the action of the magneto in one way it assists it in another so that magnetos so changed over have been known to give satisfactory service for thousands of miles.

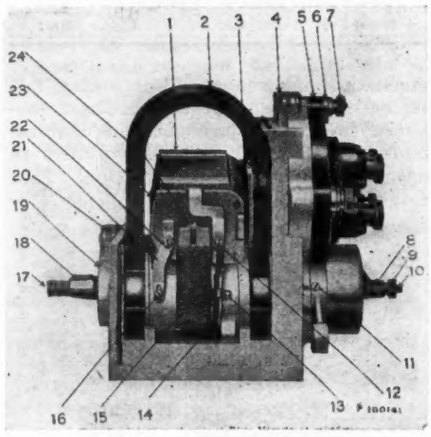


Fig. 1—Dixie magneto with cover removed. Battery is connected at 22

BATTERY USED AS BOOSTER FOR DIXIE MAGNETO

Q—We have an Overland 83B car with a Dixie magneto that has always given trouble in starting. We had the magneto sent to the factory and overhauled but it did not improve it much. When once started, the magneto does fine. There is a 6-volt battery and a self-starter on the car.

2—Is there any possible way that we can connect the battery in such a manner as to start the engine with it and then switch over to the magneto?

3—I know there are motors running with high tension magnetos and batteries for starters, but how?

4—Is there a way to connect the battery to the magneto and use the magneto as a timer without wiring the magneto?—Gulf Production Co., Eastland, Tex.

See Figs. 1 and 2 and reply to Mr. Clarence Greening, Breckenridge, Mich., In most of these installations the battery wire may be run directly from the generator side of the ammeter to the new three-point switch.

THEORY OF SPARK INTENSIFIER ACTION

Q—Give theory of the operation of the several spark intensifiers which are on the market. By increasing the resistance to the flow of current through the plug by causing the spark to jump another gap are you not weakening that spark rather than intensifing it?—Gould Battery Station, Elgin, Ill.

The principle involved is that of the condenser. When a metallic surface is placed in the path of a current, the tendency is for the current to distribute itself over the surface to a certain density. If the current is of high voltage, a point is reached where there is insufficient surface to accommodate it, and a discharge of some sort takes the place. Sometimes the discharge is in the form of an insensible dissipation of the current into the surrounding atmosphere; sometimes it takes the form of a brush discharge of a pole blue or violet "fuzzy" appearance.

If the gap between the metallic surfaces is not too wide, the electricity jumps it, after having charged the surfaces to their saturation point. A peculiarity of condenser discharges is that they are oscillatory in character, surging backward and forward like an alternating current, but at very high velocities or frequencies of alternation. It is thought that this gives rise to an ionizing effect of the gas between the spark plug

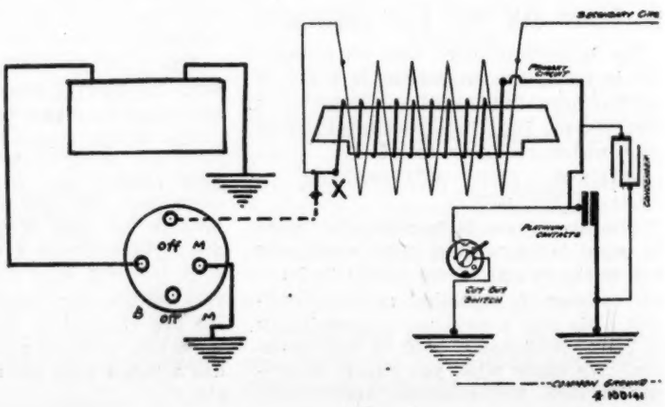


Fig. 2 — Schematic diagram of Dixie magneto windings and connections. Normally wire X is grounded by the brass strip 16-22 shown in Fig. 1

points, which results in a path of less resistance than that offered by the oil film or carbon of a dirty plug. This accounts for the intensified current jumping the gap instead of passing over the short circuit offered by the carbon or oil. It is generally conceded that intensifiers are of decided value when used with engines which are inclined to foul, but are of doubtful value with clean running engines.

A RARE GRAY & DAVIS WIRING DIAGRAM

Q—Have you any data on the old style Gray & Davis box type regulator as used on the older model of Paige cars? It is necessary that we have a diagram of the internal circuit and also the correct adjustment and alignment of the points. In fact, any information with which you can supply us will be appreciated.—M. V. Ledbetter, Denver, Colo.

Figs. 3 and 4 show two diagrams of two distinct models of the box type regulator such as were used on the generator in question. That shown in Fig. 4 was comparatively common as it was used on several other cars besides Paige, while that shown in Fig. 3 is quite rare and difficult to obtain. The adjustment of the five terminal regulator is accomplished by increasing the tension of the flat steel springs of the two small vibrating reeds found at the side of the cut-out winding.

The other type of regulator has but one regulating point which is adjusted by turning the knurled nut adjustment on the end of the relay core to the right or left. Turning it to the left will decrease the distance between the core and the armature (the small lever which carries one of the regulator points), which has the effect of increasing the intensity of the magnetic pull upon it. This causes it to separate the regulator point and insert a resistance into the shunt field circuit at a lower current value than would be the case if the gap was increased by screwing the knurled adjustment to the right.

The gap between the core and the cut-out armature is also adjustable by another knurled adjustment. The object of this adjustment is to alter the cutting-in and the cutting-out point of the device and it has no effect upon the generator output. When adjusting either of these regulators a reliable ammeter should be inserted in the circuit and the output limited to a maximum of 15 amp. at high engine speed.

WIDE-AWAKE MECHANIC EXHIBITS LAUDABLE AMBITION

Q—Being an automobile mechanic, I have realized the value of training in the automotive electrical repair field and I would like to have you recommend to me some good course in this kind of work. I would prefer that the course cover particularly rewinding both of starting motor and generator, including armature winding.

2—I would also like to know the size and amount of wire in pounds that the armature of a Remy generator off an Oakland Model 34-B is wound with a diagram for connecting the coils to the commutator segments?—Chas. A. Glassen, Salisbury, Mo.

The Readers' Clearing House

THIS department is conducted to assist Dealers, Service Stations, Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by someone else and these are answered by reference to previous issues. MOTOR AGE reserves the right to answer the query by personal letter or through these columns.

Emergency inquiries will be replied to by letter or telegram.

1—You are to be congratulated upon your ambition to better yourself in your chosen profession. We recommend the Ambu Engineering Institute, Chicago. The course offered by this institution is exclusively automotive electrical and is said to be very complete. Among other features it includes the rudiments of armature winding. We would recommend that you communicate with the concern, requesting catalogs and general information.

2—The data with which you have supplied us is insufficient for us to formulate a complete reply. If you will kindly advise us of the type number of the generator in question we will inform you regarding the right size of wire to use and the number of wires per slot of the armature. In this connection: The Associated Electric Service Stations, Suite 412, 105 W. Monroe St., Chicago, supply a book of blue prints showing the windings, commutator connections, size of wire and number of coils per armature slot of 175 different makes and types of automobile generator and starting motor armatures. The prints may be procured separately or in bound form.

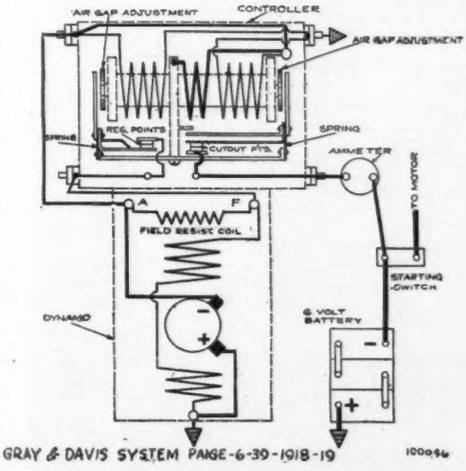


Fig. 3—Gray & Davis generator with flat type regulator. The regulating winding and points are shown at the left

DISASSEMBLING DORT LIGHTING SWITCH

Q—Advise us through the Readers' Clearing House how to disassemble the two-button switch used on the Dort 1920 model. The trouble is the dimmer connection does not make contact.

2—Is there any company making a water pump for this car?—New Era Garage, East St. Louis, Ill.

1—An examination of the galvanized plate will disclose two holes in direct alignment with the screws which hold the lighting switch parts in place. Although a quite tedious operation, these screws can be removed with a small offset screwdriver.

Another method is to hold the stems of the push button with a pair of long, slender-nosed pliers and unscrew the buttons from them. It will be noticed that the buttons are kept from turning on the stems by means of deep prick punch holes. After they are started they can be easily unscrewed, which will permit removing both of the large plates from the base of the switch.

2—We have no record of such a pump being manufactured.

FORTUNATE READER HAS CHOICE OF CHARGING CURRENT

Q—I have two sources of current available for battery charging; one is a 110-volt a.c. line and the other a 125-volt d.c. line. With current at the same price, which would be the better to use and what kind of charging apparatus would be most satisfactory with this current?—J. A. House, Dyer, Tenn.

You are indeed fortunate in that you are blessed with an embarrassment of riches. By all means use the direct current supply and avoid the expense of rectifiers. There will be no apparatus needed other than one, two, or possibly three simple rheostats of a capacity of from 10 to 15 amps. Each of these will carry from 45 to 90 cells, giving a total capacity of from 130 to 270 cells if three are used. A very good German silver rheostat can be purchased from Schafer Bros., Chicago, or you may secure a carbon tile rheostat from the Allen-Bradley Co. of Milwaukee. Prices for these apparatuses range from $35 to $50, as compared with $150 or more for an efficient rectifier.

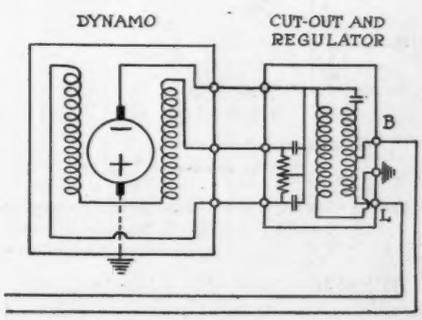


Fig. 4—A more common model of Gray & Davis generator with square box regulator housing vibrating reeds

Wiring of 1918 Overland 90 Auto-Lite System

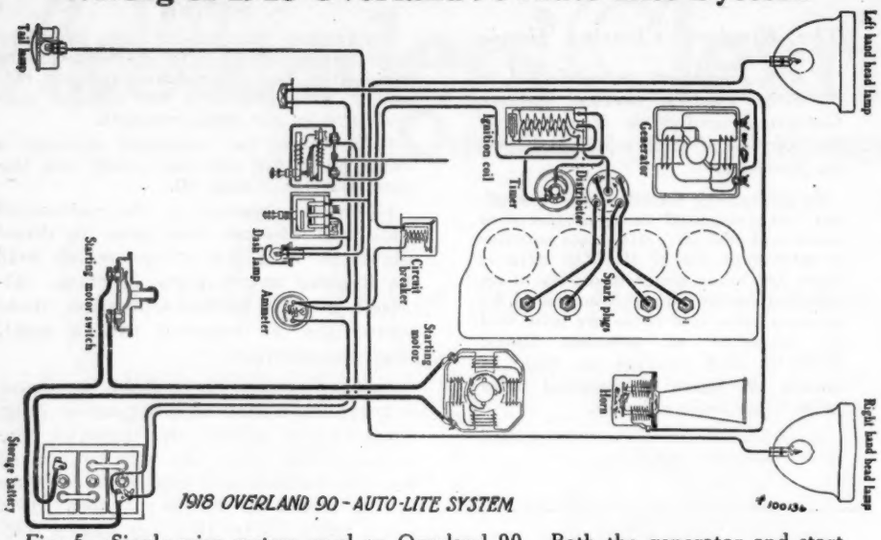


Fig. 5—Single wire system used on Overland 90. Both the generator and starting motor have one terminal grounded

1914-15-18-19 Maxwell Wiring Diagrams

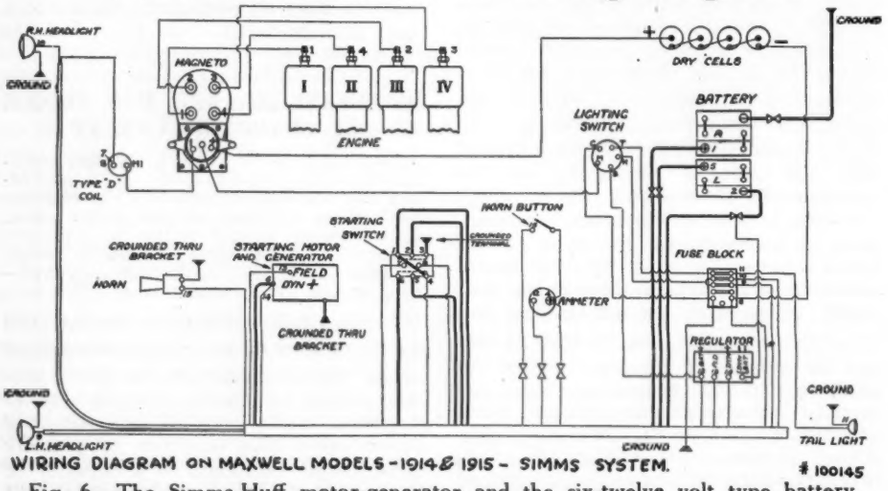


Fig. 6—The Simms-Huff motor-generator and the six-twelve volt type battery were used on the 1914-15 Maxwell car

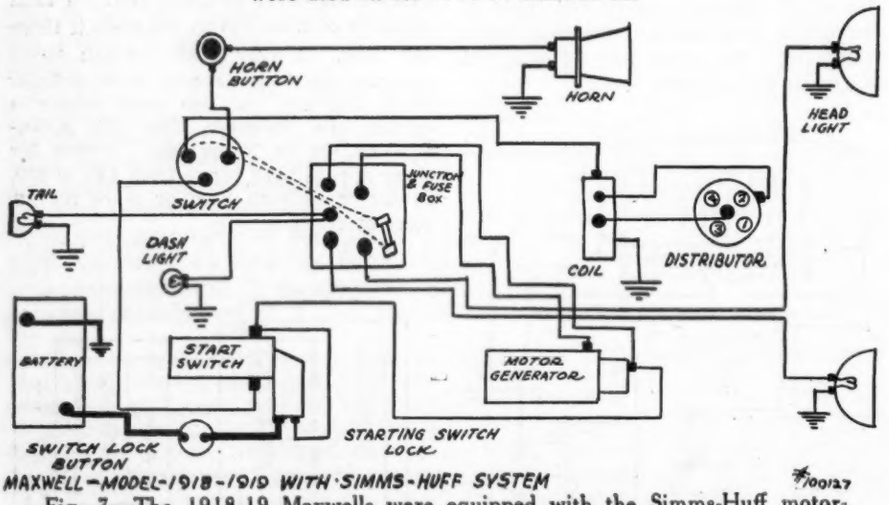


Fig. 7—The 1918-19 Maxwells were equipped with the Simms-Huff motor-generator and a straight twelve volt battery

QUESTIONS ON RECHARGING OF MAGNETS

Q—1—Give detailed description and specifications of the Quality Electrical Products Co.'s "Automatic Growler" for armature testing, announced in MOTOR AGE some time ago.

2—In remagnetizing magnets, is it necessary that the magnets come in direct contact with charging poles when magnets are to be charged while on magneto?

3—Is it necessary to remove magnet to be remagnetized or can it be more successfully performed with magnets remaining on the magneto?

4—We operate our magnetizer on 110 volt D.C. using both series and parallel connections and find in series that it will draw approximately 10 amp. and in parallel it will draw 20 amp. The cores are 3x4 in. and are wound with about No. 16 D.C.C. magnet wire. Would you advise the parallel connection as the most effective?—Leismeister Electric Shop, Harvey, N. D.

1—If by specifications you mean the gage and weight of the iron used in the growler frame and the size and quantity of the wire used in winding, we regret that we cannot oblige you, as this information is not available. However, we have published the specifications of a very serviceable growler several times, as you will find by consulting your file of back copies. The illustration shown in Fig. 8 may prove of interest, as it shows the armature faults which it is claimed the automatic growler will locate.

2 and 3—Without doubt the best way to magnetize is to remove the magnets from the magneto and disassemble them so as to treat each horseshoe separately. While it is true that magnets can be remagnetized by simply bringing them in proximity to a powerful field, better results are obtained by rubbing them on the charging apparatus.

4—You are evidently passing about the same amount of current around each core, regardless of whether you operate your apparatus in series or parallel. For this reason we would say that it should make no difference with the magnetic effect which arrangement is used. Practically, however, all of these apparatus exert a much stronger field when operated in parallel.

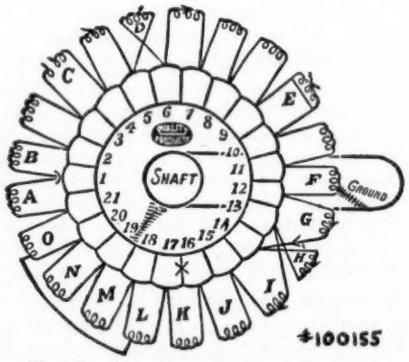


Fig. 8—Winding diagram showing armature faults such as short and open circuits.

SERIAL AND MODEL NUMBERS FAIL TO AGREE

Q—Publish wiring diagram of Maxwell 35 serial No. 35717. This is an old model equipped with magneto, motor generator and a double six-volt battery. The fuse block is located under the front seat.—L. Vilatte, Ste. Rose du Lac, Man., Canada.

You are in error regarding the model of this car. The serial number places it as a model 25-1915 car. The wiring diagram is shown in Fig. 6.

WIRING DIAGRAM OF MAXWELL 1918

Q—Publish a diagram of the charging circuit of a Maxwell 1918 car equipped with a 12-volt starting battery having only two leads.—F. J. Pease & Son, Chicago.

See Fig. 7.

OVERLAND 90 WIRING DIAGRAM

Q—Publish the wiring diagram of the Overland model 90, 1919 car.—S. J. Riggs, Pattonsburg, Mo.

See Fig. 5.

ENGINES

WHAT IS A DYNAMOMETER?

Q—Explain what a dynamometer is and how it is used in a road test.

2—Is there any remedy for noisy timing gears on a Buick D-6-45 besides installing new gears?—Howard C. Waitz, Oil City, Pa.

1—Webster's dictionary defines a dynamometer as an apparatus for measuring force or power. Latterly the term has come to be applied almost exclusively to the electrical type of apparatus. A very good example of electric dynamometer is illustrated in Fig. 9. This apparatus is in use in the plant of a well-known carbureter manufacturer in Detroit. It consists of a dynamo with a circular field frame which, being mounted on ball bearings set in retainers, is free to oscillate and pull against the two overhead scales which are used to verify each other and thus minimize chances of error.

The armature of the dynamometer is connected to the engine under test by means of a universal joint. As the engine runs it revolves the armature which, as it generates current and becomes strongly magnetic, exerts a drag upon the oscillating field frame. It is the strength of this drag which is measured by the scales.

The strength of current generated in the armature, with the resultant magnetic drag, is proportional to the speed at which the engine runs. All these factors being known, it is a simple matter to determine the horsepower output of the engine under test at any instant.

We do not understand what you mean by the use of a dynamometer in a road test. Is it not possible that you have confused it with the apparatus used to measure the drawbar pull of tractors? According to a broad interpretation of the definition given above these might properly be called dynamometers.

2—Your question is not clear, as you have failed to mention whether the noise complained of is such as is caused by the lashing of worn gears or the howl of those which are meshed too tightly. For the former there is no remedy other than replacement, while for the latter installation of a new front main bearing will help. It has been reported that a new type of composition gear recently placed on the market is giving very satisfactory results in the elimination of timing gear noises.

HORSEPOWER FORMULA CONFUSION

Q—Inform us how the estimated horsepower of a motor is figured. We have had several tell us but it seems that no two have the same formula.

2—Figuring from the average of several different styles of motors about how many cubic inches of piston displacement does it require to each estimated horsepower and to the actual delivered horsepower? —J. A. Morling & Son, Cameron, O.

1—Your confusion is pardonable; in fact, many of the designers and engineers seem to be hazy upon just what sort of a formula should be used. The principal defect of the old, original A. L. A. M.—later the S. A. E.—formula is that it has become obsolete. It was calculated on an assumed piston speed of 1000 ft. per minute, and as there is hardly an engine in service today that does not exceed this speed at maximum, the formula is no longer a correct guide.

The old formula is expressed thus: $\frac{D2N}{2.5}$

This, worked out in simple arithmetic, is piston diameter times piston diameter times number of cylinders divided by 2.5. The 2.5 is a constant which embraces an assumed mean effective pressure of 90 lb. per sq. in. of piston head area, a mechanical efficiency of 75 per cent and a piston speed of 1000 ft. per minute. If any of the latter factors are incorrect the solutions arrived at by means of the formula are erroneous.

Another formula, called the modified S. A. E. formula, was worked out by MOTOR AGE a few years ago and seems more nearly to meet present-day conditions. By it the piston speed is taken into consideration. Stated briefly, it is $\frac{D2NSR}{15,000}$, or diameter square times number of cylinder times piston stroke in inches times crankshaft revolutions per minute divided by 15,000. The denominator, 15,000, is a constant which more nearly applies to present-day engines than does the one of 2.5 of the original formula. Although, after all, the only correct way to determine the actual horsepower of an engine is by electric dynamometer test, it is remarkable how nearly the estimate, as figured by the last formula, coincides with the actual values as found by test.

2—This is impossible to answer. Of course, it is possible to take the average displacement of several different makes of engines. However, when it comes to correlating this with the actual horsepowers, the factor of varying piston speeds so upsets all calculations that the conclusions are worthless. The following table, based on the original S. A. E. formula, may prove of assistance to you:

HORSEPOWER TABLE

Bore in inches	Number of Cylinders Four	Six	Eight	Twelve
2½	10.00	15.00	20.00	30.00
2⅝	11.23	16.85	22.46	33.70
2¾	12.08	18.13	24.16	36.23
2⅞	13.37	20.00	26.74	40.00
3	14.40	21.60	28.80	43.20
3⅛	15.64	23.50	31.28	47.00
3¼	16.92	25.39	33.84	50.78
3⅜	18.21	27.30	36.42	54.60
3½	19.61	29.45	39.22	58.90
3⅝	21.08	31.57	42.16	63.14
3¾	22.50	33.75	45.00	67.50
3⅞	24.22	36.32	48.44	72.64
4	25.60	38.40	51.20	76.80
4⅛	27.20	40.80	54.40	81.60
4¼	29.00	43.50	58.00	87.00
4⅜	30.65	46.00	61.30	92.00
4½	32.40	48.60	64.80	97.20
4⅝	34.28	51.41	69.56	102.81
4¾	36.15	54.20	72.30	108.40
4⅞	38.25	57.21	76.50	114.42
5	10.00	60.00	80.00	120.00
5⅛	42.20	63.20	84.40	126.40
5¼	44.20	66.40	88.40	132.80
5⅜	46.34	69.50	92.68	139.00
5½	48.48	72.72	96.96	145.44
5⅝	50.80	76.10	101.60	152.20
5¾	53.00	79.50	106.00	159.00
5⅞	55.28	83.88	110.56	167.76
6	57.70	86.64	115.40	173.28

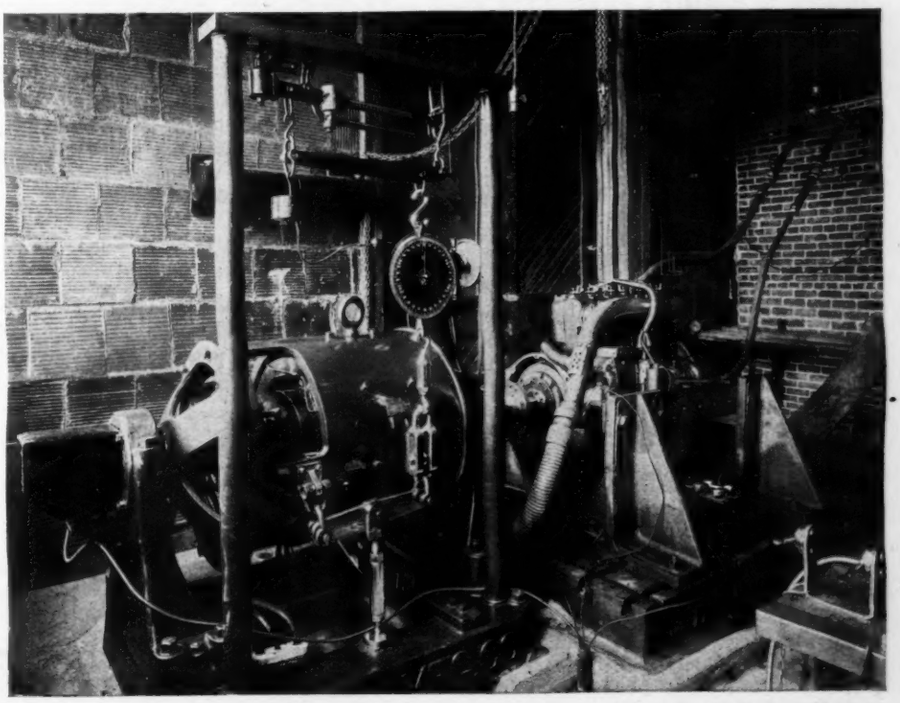


Fig. 9—An up-to-date electric dynamometer such as is used to measure speed, power and torque of automobile engines

Automotive Architecture

Planning & Building Problems

Conducted by Tom Wilder

A Corner Garage

PLAN NO. 356

I AM contemplating building a new garage this summer and am looking for advice. I have two lots selected, located on a corner, with a frontage of 60 ft. on the business street and a depth of 140 ft.

I want a showroom for two or three cars, accessory display, stockroom, repairshop for 10 cars, storage space for as many cars as the building will allow, battery department, welding department, ladies' restroom, washroom for shop and tourist, toolroom, half basement for oils and heavy stock, heating, etc.

I will operate a small sized machine-shop and do a large repair business.

Will have an outside filling station either in front or using corner of building, as space will permit. I will be pleased to have your plan for such a building and am open to any suggestions that you may offer for a modern garage. Would also like to have a few specifications so that I may be able to get an estimate on the cost.—Patterson's Garage, Terry, Mont.

We have laid out the building the full size of the lot, because we think it would be unsatisfactory to make it shorter. As it stands, you might take 5 or 6 ft. off the showroom, 2 ft. off the office strip, nothing off the garage unless you eliminate one row of cars, or about 15 ft. That will eliminate your tire repair shop and 7 or 8 ft. of stockroom, and only reduce the length of the building 23 ft. at most.

With all the departments you contemplate, we believe it will be out of the question to consider a corner filling station. If you have room in front—that is, if the street is wide and congestion not too great—a curb pump will sell about as much gas as a corner station with one pump. If you give too much prominence to your gasoline business you put car sales and service into the background, so, all considered, we think the curb pump preferable here.

With a good division of space we were unable to arrange for the full 10-car shop asked for, though there is space to receive two more besides the nine we show. In this layout the three cars in the corner can only be gotten in and out by moving others; but by placing the extensive overhaul jobs in these positions, little trouble need be experienced.

With regard to specifications there is not must we can do. You can go to your contractor and go over the details point by point, setting them down as you go, then make two copies and both sign them in case you give him the job. Or you can go to an architect and have him make detailed drawings and furnish specifications which will be very complete, covering every phase of building, including forfeits for delays, insurance while construction is in progress, employers' liability insurance, etc.

The former would be the more inexpensive way, but the latter is the surest way of getting what you go after without any pitfalls.

We should truss the whole roof, either with lattice, timber or steel trusses, suspending the ceiling of the showroom and offices on their under side. Inasmuch as your country gets pretty cold, it is advisable to partition off the shops both above and below, so that those desiring heat may have it without the necessity of heating the whole building.

Automotive Architecture

IN this department MOTOR AGE aims to assist its readers in their problems of planning, building and equipping service stations, garages, dealers' establishments, shops, filling stations, and in fact any buildings necessary to automotive activity.

When making requests for assistance please see that we have all the data necessary to an intelligent handling of the job. Among other things we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repairshop.

And how much of an accessory department is anticipated.

A Three-Level Garage In a Road Fork

PLAN 353

We are proposing to erect on the lot as shown a three-story garage—basement and two stories above, stone or brick construction. Basement would be used for truck service, and machine shop; first floor for accessories in connection with gasoline station, office department, new car showroom to carry six new cars, and service work in rear of salesroom. This department is for quick service on tires, car adjustments and light repairs. Second floor to be used for overhaul jobs, paint-shop, etc.

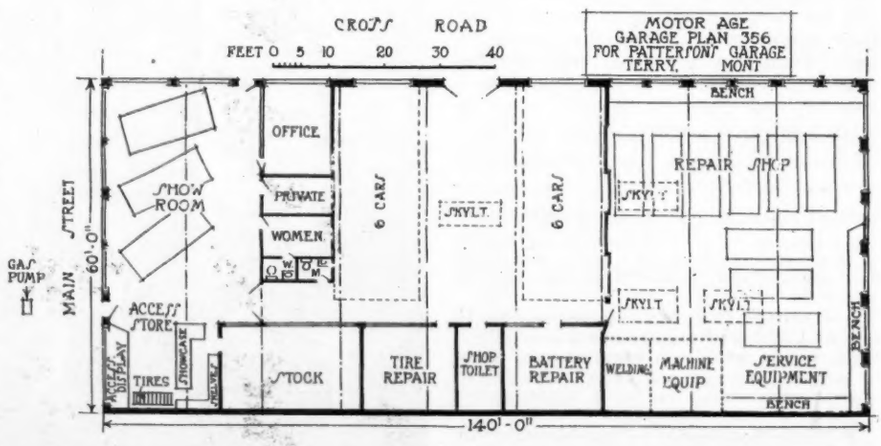
Entrance to basement is to be from street No. 2; to first floor from street No. 1; to second floor from main highway. The lot lays so that this can be accomplished. A narrow service stairway will lead to all three floors inside the building.

Equipment is to comprise: solid tire press, power lathe, burning-in stand, emery wheel, battery charger, forge, auto air outfit, 5,000 gal. electric driven gasoline outfit, all of the above to be of the self-contained motor driven type.

Gasoline pump will be on an island to serve both sides and to be covered with neat veranda from the front of building. The front of building is to be ornamental pressed brick and the veranda in keeping with same. We want a high class appearing job—room for a sign all the width of front, or your suggestion showing lettering, "Simpson's Garage."—A. Simpson, Beckley, W. Va.

This looks like a wonderfully good and advantageous position for a garage. On a fork, as it is, with one road going down and one up, giving access to both basement and second floor while the main floor is on the fork level, it has many natural advantages in your favor. The fork is always perplexing to strangers; they are obliged to slow up to see which way to go; if they need gasoline, as a certain per cent will, you stand a good chance of supplying them.

If you have truck service in the basement and passenger car service on the



Plan 356—Suitable for showroom, accessory counter and repairshop

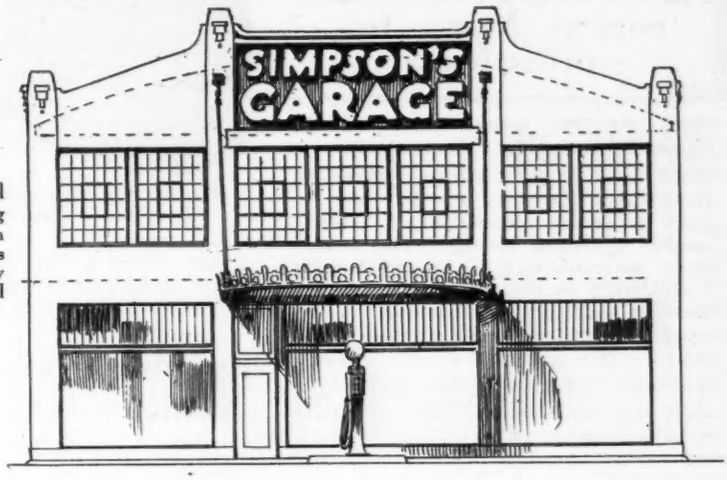
top floor you will need some duplication of machinery and equipment. Perhaps all the unit overhauling could be done in the basement machineshop or in the second floor shop, whichever proved to have the most available space. The basement location would seem to be the best as it would be easier to transport passenger car engines, axles, etc., than those belonging to trucks.

The canopy over the gasoline pump is supported by chains or ornamental tie rods anchored on the roof, so that there are no posts to interrupt movements of cars or be damaged by them.

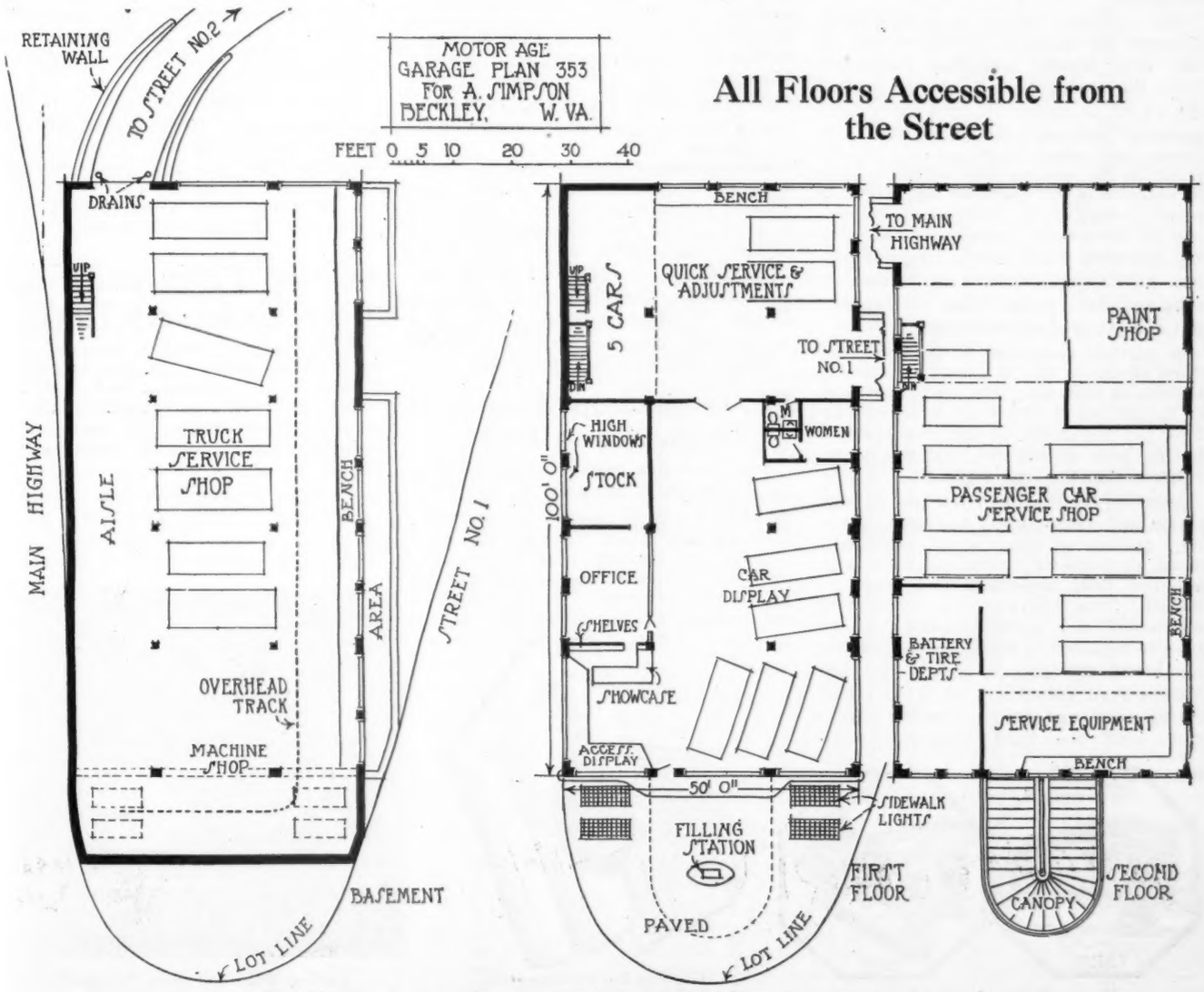
It may be difficult to enter the basement as near the main highway as we have shown, but, if not calling for too much excavation, that is the best place since the street No. 1 side is the light side and valuable as shop space, while the other side will be dark and of little use except for aisle or storage. A short retaining wall as indicated might make the entrance possible.

The roof may be supported by trusses or the post system shown and the basement and first floor substituted on the third. The trusses will cost more but they leave the upper floor free from posts, which is quite an advantage and worth all it costs in the long run.

The elevation we show is very simple and can be best handled in brick. The letters of the sign are intended to be in bold relief, three or four inches high, white or gold on their face with dark background. They may be cut out of wood and attached to the background, or the whole panel may be made in terra cotta, the later being much better though more expensive. Surrounded as you are by roads, there is really no front, and rather than put so much into an expensive frontage, it is best to use a good modest grade of brick on all three street sides.. We would keep the three sides the same by all means; it would be different if there were buildings close to you on either side.



This front will show a long distance down the street, as it practically blocks the end



This location on a combination hairpin turn and fork is very advantageous

The Accessory Show Case

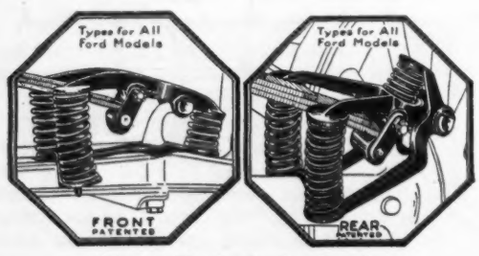
New Fitments for the Car

New Float-a-Ford Incorporates Many Improvements

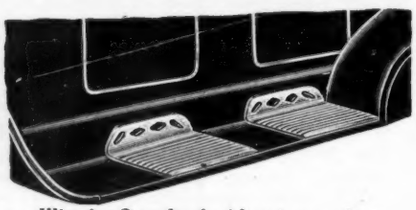
The improved model Float-a-Ford shock absorber manufactured by the Burpee-Johnson Co., Indianapolis, is claimed not only to improve the riding qualities of the Ford car but also to check the sudden rebound which so often results in broken springs. The former highly desirable end is accomplished by a peculiarity in the design of the shock absorber which has the effect of lengthening the car springs by several inches and through a system of compound leverages and coil compression springs so absorbing road shocks in the mechanism of the apparatus that very few of them are communicated to the car body and occupants.

The snubbing action is accomplished through the medium of a short end of the lever which, projecting outwardly from the spring perch, between it and the wheel, is suspended by a third compression coil spring. Before the car spring can attain sufficient velocity to result in the racking rebound, its energy is practically all absorbed by the third recoil spring, which, later slowly returning to its normal extension, dissipates the energy in the form of a long undulating wave which results in a smooth, rocking effect rather than the sudden jolt and jar of a severe bump.

A further assertion in favor of the third spring is that it exerts a sufficient tension to eliminate side sway. The arms of the improved device are exceptionally long for apparatus of this character, it having been determined after much calculation that the longer the arms, within reasonable limit, the better the spring action and consequently the riding quality. Instead of being shipped knocked down, as formerly, the new apparatus is supplied fully assembled and ready to install. This will prove of interest to mechanics and service stations as no time is required to assemble and anchor the heavy springs. It is said that the Float-a-Ford comes as nearly to duplicating cantilever spring action as is possible with the Ford transverse type spring. Float-a-Ford shock absorbers may be procured through distributors or from the manufacturers direct.



Float-a-Ford shock absorber



Illinois Standard Aluminum Step Plate

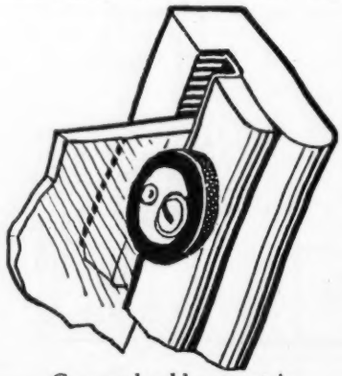
Eccentric "Button" Anti-Rattler Keeps Windows Quiet

An ingenious little fitment, remarkable for its simplicity is the Button Anti-Rattler offered by the Campbell Manufacturing Co., 2835 Southeast Blvd., Kansas City, Mo. The device consists of two hard steel nickel plated washers between which is a rubber disk somewhat larger in diameter.

Drilled with a slightly off-center hole, the contrivance acts as a wedge when applied to the window sill or sash with a wood screw and so turned that the edge of the rubber disk bears firmly against the glass. The Anti-Rattler does not interfere with the window operation as with it locked firmly against the glass the window may be raised or lowered, automatically releasing the device.

Oil Gage Stops Engine If Lubrication Fails

The Tel-Oil, a new oil gage for Ford cars, not only indicates at all times just how much oil there is in the crankcase, but also closes a contact and short circuits the magneto, should replenishment be neglected and the oil level fall to the danger point. Manufactured by the Lubricating Specialties So., Toledo.



Campbell eccentric "Button" Anti-Rattler

Aluminum Step Plate Adds Class to Car Appearance

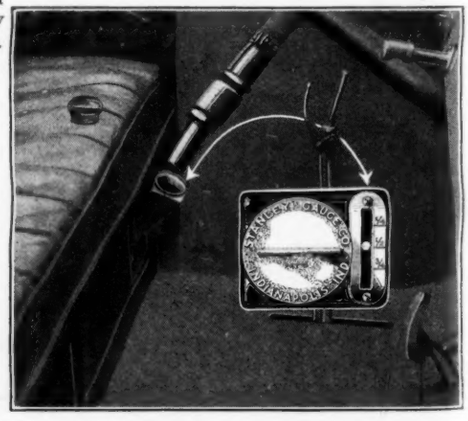
Aluminum step plates, designed for attachment to the car running boards, have a triple appeal for the reason that they serve two useful purposes and also satisfy the esthetic sense.

The clean, white aluminum plates add an air of distinction to the car as they set off the long plain expanse of the running board and, considered from the standpoint of utility, the features are that they afford a firm footing and keep the foot from slipping inward and scratching or scuffing the splash apron. This last is accomplished by so forming the plates that they extend upward at the back edge. An evidence of thought in the design is the recess in the undersides and outer edges of the plates which permit of a smooth installation, the recesses fitting over the outer moulding of the running board.

Made in a handy size, 8 by 11 in., the plates retail for $5 per pair, and may be procured from the Illinois Brass Manufacturing Co., 224 North Ada St., Chicago, Ill. They are cataloged under the distinctive trade name of the Illinois Standard Aluminum Step Plate.

Stanley Filler and Gage for Underseat Tanks

When equipped with a Stanley gasoline filler and gage which may be quickly applied to any underseat tank, it is unnecessary for the car passengers to vacate their seat during the operation of refueling. Being plainly visible at all times, the gage gives ample warning of a low gasoline supply in time to have it replenished. Selling at $5, the device is made by the Stanley Gauge Co., Washington and Pine Sts., Indianapolis.



Stanley filler and gage for underseat tanks

Fan Belt Sizes and Types
1921 Trucks

Motor Age Maintenance Data Sheet No. 163

One of a series of weekly pages of information valuable to service men and dealers—save this page

Name of Model	Capacity or Rating	Type of Belt	Width of Belt	Length of Belt	Degree of Angle if Vee Type
MacDonald, A	10	Flat	2	35	.....
Mack, AB	1½	Flat	1½	33	.....
Mack, AB	2	Flat	1½	33	.....
Mack, AC	3½	Vee	1	93½	45
Mack, AC	5	Vee	1	93½	45
Mack, AC	6½	Vee	1	93½	45
Mack, AC	7½	Vee	1	93½	45
Mack Tractor, AB	5	Flat	1½	33	.....
Mack Tractor, AC	7	Vee	1	93½	45
Mack Tractor, AC10	10	Vee	1	93½	.....
Mack Tractor, AC	13	Vee	1	93½	45
Mack Tractor, AC	15	Vee	1	93½	45
Master, JW	1½	Flat	1	30½	.....
Master, W and WL	2½	Flat	1¼	31	.....
Master, D and DL	2½	Flat	1¼	31	.....
Master, A and AL	3½	Flat	2	35	.....
Master, E and EL	3½	Flat	2	35	.....
Master, B and BL	5	Flat	2	35	.....
Master, F and FL	5	Flat	2	35	.....
Master, T	6	Flat	1¼	31	.....
Maxwell, 1920	.....	Flat	1½	44¼	.....
Menominee, HT	1	Flat	1¼	33¾	.....
Menominee, H	1½	Flat	1¼	33¾	.....
Menominee, D	2	Flat	2	37¾	.....
Menominee, G	3½	Flat	2	37¾	.....
Menominee, S-3	5	Flat	2	40¾	.....
Moline, 10	1½	Flat	2	42½	.....
Moline	1½	Flat	2	39 5/16	.....
Moreland, 21B	1½	Flat	1¼	42¾	.....
Moreland, 21C	2½	Flat	1½	42¾	.....
Moreland, 21H	3½	Flat	2	42	.....
Moreland, 21S	5	Flat	2	42	.....
Mutual, 2B	2	Flat	2	37½	.....
Mutual, 2BP	2½	Flat	2	37½	.....
Napoleon, 9	1	Flat	1	36½	.....
Napoleon, 11	1½	Flat	1	36½	.....
Nash, 2018	1	Flat	1	35¾	.....
Nash, 3018	2	Flat	1	35¾	.....
Nash, 4017	2	Flat	2	43¾	.....
Nelson & LeMoon, G1½	1½	Flat	1½	40½	.....
Nelson & LeMoon, G2½	2½	Flat	1½	40½	.....
Nelson & LeMoon, G3½	3½	Flat	1½	40½	.....
Nelson & LeMoon, F5	5	Flat	2	40½	.....
Niles, E	2	Flat	¾	30	.....
Noble, A-21	¾	Flat	¾	33	.....
Noble, B-30	1½	Flat	1⅞	34¼	.....
Noble, D-50	2½	Flat	1⅞	34¼	.....
Noble, E-70	3½	Flat	1⅞	34¼	.....
Northway, B2	2	Vee	⅝	31	28
Northway, B3	3½	Vee	⅝	31	28
Ogden, E	2½	Flat	1¼	32	.....
O. K., K-1	1½	Flat	2	36	.....
O. K., L-1	2½	Flat	2	36	.....
O. K., M-1	3½	Flat	2	38	.....
Old Hickory, W	1	Vee	¾	37½	20
Oldsmobile Economy	1	Vee	21/32	32⅜	32
Oneida, B-10	2	Flat	2	38½	.....
Oneida, C-9	2½	Flat	2	38½	.....
Oneida, D-9	3½	Flat	2	40	.....
Oneida, E-9	5	Flat	2	40	.....
Orleans	1½	Vee	2	40	45
Olympic	2½	Flat	2	34	.....
Packard, EC	.....	Vee	¾	41 1/16	45
Packard, ED	.....	Vee	¾	43 3/16	45
Packard, EF	.....	Vee	¾	43 3/16	45
Packard, EX	.....	Vee	¾	41 1/16	45
Packard, EY	.....	Vee	¾	43 3/16	45
Paige, 52-19	1½	Flat	2	36	.....
Paige, 54-20	2½	Flat	1¼	37⅝	.....
Paige, 51-18	3½	Flat	2	37⅝	.....
Parker, F-20	2	Flat	2	38	.....
Parker, J-20	3½	Flat	2	38	.....
Parker, M-20	5	Flat	2	39½	.....
Piedmont, 4-30	1½	Flat	¾	29	.....
Pierce-Arrow, X5	2	Flat	½	48½	.....
Pierce-Arrow, W2	3½	Flat	1½	48½	.....
Pierce-Arrow, R10	5	Flat	1½	48½	.....
Pioneer, AA	1	Flat	1	35	.....
Pittsburger, B-21	2½—3	Flat	1¼	46	.....
Rainier, 11	¾	Vee	¾	40	.....
Rainier, 19	1	Vee	¾	40	.....
Rainier, 16	1½	Vee	¾	40	.....
Rainier, 18	2	Vee	¾	40	.....
Rainier, 15	3½	Vee	¾	40	.....
Ranger, B	1½	Flat	1	33¾	.....
Reliance, 10A	1½	Flat	2	35	.....
Reliance, 20B	2½	Flat	2	33½	.....
Reo, F	¾	Flat	⅞	39 1/32	.....
Republic M-10	1	Flat	1¼	40 5/16	.....
Republic, M-11X	1½	Vee	⅝	39⅛	.....
Republic, M-19	2½	Flat	1¼	32 5/16	.....
Republic, M19W	2½	Flat	1¼	32 1/16	.....
Republic, M20	3½	Flat	1½	36¼	.....
Reynolds, HD	2	Flat	2	.....	.....
Reynolds, HE	3	Flat	2	.....	.....
Reynolds, F	4	Flat	2	.....	.....
Reynolds, D	6	Flat	2	.....	.....
Riker, B	3	Vee	1¼	49½	28
Riker, BH	4	Vee	1¼	49½	28
Rowe, CW	1½	Flat	1⅛	32¼	.....
Rowe, CDW	2	Flat	1⅛	32¼	.....
Rowe, GSW	3	Flat	2	36	.....
Rowe, GPW	3	No belt used			
Rowe, BW	4	Flat	2	36	.....
Rowe, FW	5	Flat	2	36	.....
Rumley, A	1½	Flat	2	35¾	.....
Samson, 15	¾	Vee	21/32	36½	32
Samson, 25	1¼	Vee	21/32	39⅝	32
Samson, M	2	Flat	2	.....	.....
Sandow, C	1	Vee	¾	31	.....
Sandow, CG	1½	Vee	¾	31	.....
Sandow, I	2	Vee	¾	31	.....
Sandow, J	2½	Flat	¾	30¼	.....
Sandow, M	3½	Flat	¾	30¼	.....
Sandow, L	5	Flat	¾	30¼	.....
Sanford, 25	2½	Flat	1⅛	31	.....
Sanford, 35	3½	Flat	1⅛	31	.....

Specifications of Current Passenger Car Models

NAME AND MODEL	Engine Make	Cylinders: Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Ace G	Guy	6-3¼x5	123	32x4	$2975	$2975	....	$3680	$3680
Ace H	H-S	6-3⅝x5	123	32x4	2975	2975	....	3680	3680
Ace L	H-S	4-3¼x5	116	32x4	2260	2260	....	....	....
Allen Series 43	Own	4-3½x5	110	32x4	‡1385	1385	....	....	2195
Ambassador R	Cont	6-3⅝x5¼	136	33x5	....	†4500	$4500	....	6500
American C	H-S	6-3¼x5	127	32x4	2195	2275	†2350	....	3150
Anderson Series 40	Cont	6-3¼x4½	120	33x4	2195	1795	1845	2795	2795
Apperson 8-21-S	Own	8-3¼x5	130	34x4½	....	3000	3250	4500	4500
Apperson Anniversary	Own	8-3¼x5	130	34x4½	....	3500	3750	....	....
Auburn 6-39	Cont	6-3¼x4½	120	32x4	....	1695	†1695	2795	2795
Beggs 20T	Cont	6-3¼x4½	120	33x4	1775	1775*	....	2675	2775
Bell 4-32	H-S	4-3½x5	114	31x4	....	1495	....	....	....
Bell 6-50	H-S	6-3¼x5	124	32x4	....	1695	....	....	....
Biddle 81	Buda	4-3⅝x5⅛	121	32x4	3475	3475	....	....	3975
Birch Super-Four	H-S	4-3½x5	117	33x4	1345	1345	†1395	2295	2295
Birch Light Four	LeR	4-3⅛x4½	108	30x3½	1195	1195	....	....	....
Birch Light Six	H-S	6-3¼x5	117	33x4	1595	1595	....	....	....
Bour-Davis 21S	Cont	6-3½x5¼	126	33x4½	†2385	†2385	2385	....	....
Brewster 91	Own	4-4 x5½	125	32x4½	†7000	7000	....	....	10500
Briscoe 4-34	Own	4-3⅝x5	109	31x4	1085	1085	....	1685	1685
Brook S-21 A	Own	2-3½x3⅝	90	28x3	395	....	....	....	....
Buick 1922-34-35-36-37	Own	4-3⅝x4¾	109	31x4	935	975	....	1475	1650
Buick 1922-41-5-6-7	Own	6-3⅜x4½	118	33x4§	1495	1525	....	2135	2435
Buick 1922-48-9-50	Own	6-3⅜x4½	124	34x4½	....	....	1735	2325	2635
Bush E.C.4	Lyc	4-3½x5	116	33x4	....	1195	....	....	....
Bush E.C.6	Rut	6-3⅛x5	116	33x4	....	1345	....	1750	1850
Cadillac 59	Own	8-3½x5½	125	34x4½	3790	†3790	....	....	4950
Carroll C	Roch	6-3½x5	132	35x5	....	....	3940	....	5190
Case V	Cont	6-3½x5¼	128	32x4½	3185	3185	....	....	....
Chalmers 6-30	Own	6-3¼x4½	126	34x4½	....	†2250	2250	2900	3285
Chalmers 6-30	Own	6-3¼x4½	117	32x4	1495	1545	....	2295	2445
Champion Tourist	Lyc	4-3½x5	122	33x4½	....	....	1795	....	....
Champion Special	H-S	4-3½x5	113	32x3½	....	1095	....	....	....
Chandler Six	Own	6-3½x5	118	32x4	†1395	1395	....	....	....
Chevrolet 490	Own	4-3⅛x4	123	33x4	1785	†1785	1785	2785	2885
Chevrolet FB	Own	4-3⅛x4	102	30x3½	625	625	....	975	975
Cleveland 40	Own	4-3⅛x5¼	110	33x4	975	975	....	1575	1575
Climber Four	H-S	6-3 x4½	112	32x4	1295	1295	....	2195	2295
Climber Six S	H-S	4-3½x5	115	33x4	1450	1385	....	....	....
Cole 870	Nort	6-3¼x4½	125½	32x4½	2250	2250	....	....	....
Columbia Challenger	Rut	8-3½x4½	127	33x5	2550	†2695	2795	3695	3995
Columbia D-C&CS	Cont	6-3½x5	115	32x4	....	1195	....	†1995	1995
Comet C-53	Cont	6-3¼x4½	115	32x4	1475	1475	....	†2295	2350
Commonwealth 44	H-S	6-3½x5¼	125	33x4½	....	2350	2450	....	3650
Crawford 21-6-40	Cont	4-3½x5	117	32x4	....	1395	....	....	2465
Crow-Elkhart L63-65	Lyc	6-3¼x5¼	122½	32x4	3000	3000	....	....	4500
Crow-Elkhart S63-65	H-S	4-3½x5	117	33x4	‡1295	1295	....	....	....
Daniels D-19	Own	6-3¼x5½	117	33x4	‡1545	1545	....	....	2395
Davis 61-67	Own	8-3½x5¼	132	34x4½	‡5350	†5350	5350	6250	6950
Dispatch	Cont	6-3¼x4½	120	33x4	†1995	1895	†2150	2795	2795
Dixie Flyer H-S-10	Wisc	4-3⅝x5	120	34x4	1250	1350	1350	1525	1575
Dodge Brothers	H-S	4-3½x5	112	32x4	1445	1445	....	2295	2345
Dorris 6-80	Own	4-3⅞x4½	114	32x4	935	985	....	1585	1785
Dort 17-12	Own	6-4 x5	132	33x5	....	†4785	4785	5800	6690
Duesenberg	D-Ly	4-3½x5	108	31x4	985	985	....	1535	1685
Dupont A	Own	8-2⅞x5	128½	33x5	5600	5600	....	....	7500
Durant A-22	Own	4-3⅛x5½	124	32x4½	3400	†3400	....	....	4900
Elcar K-4	Cont	4-3⅞x4¼	109	31x4	....	890	....	....	....
Elcar 7-R	Lyc	4-3½x5	117	33x4	1195	1195	....	....	....
Elgin K-1	Cont	6-3¼x4½	117	33x4	†1595	1595	‡1195	2395	2495
Essex	Falls	6-3½x4¼	118	33x4	1595	1495	†1595	2395	2395
Fergus S-5-21	Own	4-3⅝x5	108½	32x4	1445	1445	....	1950	2300
Ferris T	Own	6-3¼x5	126	33x4½	....	Chassis	s Price	8500	....
Ford	Cont	6-3½x5¼	130	32x4½	3350	....	2595	....	3675
Franklin 9-B	Own	4-3⅜x4	100	30x3½	**370	††415	....	695	760
Friend Four	Own	6-3¼x4	115	32x4	2550	2650	†2550	....	3650
Gardner G	Lyc	4-3¼x4½	112	32x3½	‡1285	1285	....	1985	2085
Grant Six	Own	4-3½x5	112	32x3½	‡995	‡995	....	....	1795
H.C.S	Weid	6-3½x4½	116	32x4	1550	1550	....	2450	2450
Halladay, Manh. Special	Rut	4-3⅝x5½	120	32x4½	2725	†2775	....	3450	3650
Halladay, Craft Special	Rut	6-3½x5	118	33x4	....	1695	....	....	....
Handley-Knight	Kn'ht	6-3½x5	123	33x4	....	2295	....	....	....
Hanson Six 60	Cont	4-4½x4½	125	32x4½	....	....	2850	1985	4185
Harroun A-A-2	Own	6-3¼x4½	121	32x4	1795	1795	1895	†2775	2885
Hatfield A-42	H-S	4-3¼x5¼	106	30x3½	....	1195	....	....	....
Haynes 75	Own	4-3½x5	115	32x4	1495	1495	....	....	2395
Haynes 55	Own	6-3½x5 1/16	132	34x4½	2685	2485	2485	3185	3485
Haynes 48	Own	6-3½x5	121	33x4	1835	1785	....	....	2835
Holmes Series 4	Own	12-2⅞x5	132	34x4½	4200	3635	3635	4650	4950
Hudson Super 6	Own	6-3¼x4¼	126	34x4½	†2950	....	2950	3850	4150
Huffman R	Cont	6-3½x5	126	34x4½	†2250	....	2250	3125	3250
Hupmobile Series R	Own	6-3¼x4½	120	32x4	1845	1795	....	....	2775
Jackson 638	Cont	4-3¼x5½	112	32x4	1485	1485	....	2400	2485
Jordan M	Cont	6-3¼x4½	121	32x4½	†2685	1950	....	3760	3760
Jordan F	Cont	6-3½x5¼	120	32x4	2250	2250	....	3300	3300
Kenworthy 8-90	Own	8-3 x5¼	127	32x4½	....	....	2475	....	3700
Kessler K	Own	4-3¾x3¾	130	32x4½	5000	5000	5250	6000	6000
King J	Own	8-3 x5	117	32x4	....	1995	....	....	2445
Kissel 45	Own	6-3⅞x5½	120	32x4½	2740	†2725	*2725	....	4035
Kline Kar 6-55-K	Cont	6-3½x4½	124	32x4½	2975	†2975	2475	†3775	*3775
Kurtz Automatic A	H-S	6-3¼x5	121	33x4	2090	2090	2090	3250	3290
LaFayette 134	Own	8-3¼x5¼	122	32x4	....	2050	....	....	3000
Leach 21-A-B&C	Cont	6-3½x5¼	132	33x5	4850	4850	4850	6250	6500
Lexington Series S	Cont	6-3¼x4½	128	32x4½	‡5700	5200	5700	....	....
Lexington Series T	Anst	6-3¼x4½	122	32x4	....	1885	....	2750	3150
Liberty 10-C	Own	6-3½x5	128	32x4½	....	....	2785	....	4150
Lincoln	Own	8-3⅝x5	117	32x4	1595	1595	†1675	2400	2495
Locomobile	Own	6-4½x5½	130	33x5	4300	4300	4300	4950	5400
Lorraine 21-T	H-S	4-3½x5	142	35x5	....	†8600	8600	....	....
			114	32x4	1665	1665	....	2590	2590

NAME AND MODEL	Engine Make	Cylinders: Bore and Stroke	WB	Tires	2-Pass.	5-Pass.	7-Pass.	Coupe	Sedan
Maibohm B	Falls	6-3⅛x4¼	116	32x4	‡1575	$1575	†1750	$2395	$2395
Marmon 34	Own	6-3⅜x5½	136	32x4½	4185	†3985	3985	4875	5275
Maxwell 25	Own	4-3⅜x4½	109	30x3½	845	845	....	1445	1545
McFarlan 1921	Own	6-4½x6	140	33x5	6300	†6300	6300	7500	7500
Mercer Series 5	Own	4-3¾x6¾	132	32x4½	4500	†4500	*4500	5700	6200
Merit	Cont	6-3¼x4½	119	32x4	2245	††2245	....	....	....
Meteor R&RR	Dues	4-4½x6	129	32x4½	5500	5500	....	....	....
Metz M6	Rut	6-3½x5	120	32x4	1995	1995	....	2795	2895
Mitchell F-40	Own	6-3¼x5	120	33x4	‡1490	1490	....	2590	2690
Mitchell F-42	Own	6-3½x5	127	33x4	....	....	1795	....	....
Moller A	Own	4-2¾x4	100	27x3½	2000	....	....	....	....
Monroe S-9 & 10	Own	4-3¼x4½	115	32x3½	1295	1295	....	....	....
Monroe S-11 & 12	Own	4-3¼x4½	115	33x4	....	....	....	2075	2175
Moon 6-48	Cont	6-3¼x4½	122	32x4	2085	1985	2485	2985	2985
Murray-Mac Six	Own	6-3½x5¼	128	34x4½	4250	4250	4250	....	....
Nash 681-7	Own	6-3¼x5	121	33x4	1525	1545	†1695	2395	2695
Nash 682	Own	6-3¼x5	127	34x4½	....	....	1695	....	....
Nash Four 41-4	Own	4-3¼x5	112	32x3½	1175	1195	....	1735	1935
National Sextet BB	Own	6-3½x5¼	130	32x4½	2990	†2990	2990	3990	3990
Nelson D	Own	4-3½x4¾	104	32x4	....	1900	....	....	....
Noma 1C	Cont	6-3¼x4½	128	32x4½	3000	†3200	....	....	4450
Northway	Own	6-3½x5¼	128	33x5	4200	*4200	6000	5600	5400
Norwalk 430-KS	Lyc	4-3½x5	116	32x3½	. ..	1035	....	....	....
Oakland 34-C	Own	6-2⅞x4¾	115	32x4	1095	1145	....	1625	1725
Ogren 6-60	Own	6-3½x5¼	134	33x5	†3850	3750	3900	5000	5400
Oldsmobile 43-A	Own	4-3⅞x5¼	115	32x4	†1325	1345	....	1895	2100
Oldsmobile 37A	Own	6-2⅞x4¾	112	32x4	†1450	1450	....	2145	2145
Oldsmobile 46	Own	8-2⅞x4¾	122	33x4½	....	†1825	1875	....	2775
Oldsmobile 47	Own	8-2⅞x4½	115	32x4	....	†1725	....	2225	2425
Overland 4	Own	4-3⅜x4	100	30x3½	695	695	....	1000	1275
Packard Single-Six	Own	6-3⅜x4½	116	33x4½	2975	2975	....	3750	3975
Packard Twin Six	Own	12-3 x5	136	35x5	4850	*4850	4850	6600	6800
Paige 6-42	Own	6-3¼x5	119	32x4	1635	1635	....	2450	2570
Paige 6-66	Cont	6-3⅜x5	131	33x4½	†2975	‡3295	2875	3755	3830
Pan American E&F-6-55	H-S	6-3¼x5	121	33x4	2000	2000	2100	....	....
Parenti 1921	Own	8-2⅞x4¼	125	32x4	....	2000	....	....	3000
Paterson 650	Cont	6-3¼x4½	120	33x4	....	1595	1625	2895	2895
Peerless 56-S-7	Own	8-3½x5	125	34x4½	....	†2990	2990	3680	3950
Peters	Own	2-3½x3⅜	90	28x3	385	....	....	....	....
Piedmont 4-30	Lyc	4-3½x5	116	32x3½	....	....	1270	....	....
Piedmont 6-40	Cont	6-3¼x4½	122	32x4	....	1495	....	....	....
Pierce-Arrow	Own	6-4 x5½	138	33x5	8000	†7500	7500	8500	9000
Pilot 6-45	Teetor	6-3½	120	32x4	1945	1895	....	....	....
Pilot 6-50	H-S	6-3¼x5	126	32x4½	2285	2285	2335	3350	3400
Porter 40	Own	4-4⅝x6¾	142	35x5	6750	Chassis	s Price	....	....
Premier 6-D	Own	6-3⅜x5½	126¾	33x5	3790	†3690	3890	4690	5190
Premocar 6-40 A	Falls	6-3½x4¼	117	33x4	1295	1295	....	....	....
Raleigh A-6-60	H-S	6-3¼x5	122	32x4½	2250	2250	....	3100	3200
R & V Knight R	Own	4-3⅝x5	116	32x4	....	2150	....	2850	2950
R & V Knight J	Own	6-3½x4½	127	32x4½	....	3350	3350	4000	4200
Reo T-6	Own	6-3⅛x5	120	33x4	1650	1650	....	2700	2750
Revere C	Dues	4-4½x6	131	32x4½	4850	4650	†4650	....	6500
Roamer 6-54-E	Cont	6-3½x5¼	128	32x4½	3150	†3150	3250	†3985	†4100
Roamer 4-75-E	Dues	4-4¼x6	128	32x4½	4150	3985	....	....	....
Rolls-Royce	Own	6-4½x4¾	143½	33x5	U. S.	Chassis	s Price	11750	....
Romer	Cont	6-3¼x4½	120	32x4	2000	2000	2100	2450	2750
Saxon 125	Own	4-3½x5	112	32x4	1545	1495	....	2295	2295
Sayers Six DP	Cont	6-3¼x4½	118	33x4	2145	1945	....	....	2995
Scripps-Booth B-39-42	Nort	6-2⅞x4¾	115	32x4	†1275	1295	....	1950	2100
Scripps-Booth F-43-46	Cont	6-3¼x4½	115	32x4	1470	1490	....	2350	2375
Seneca L & O	Lelt	4-3½x4½	108	30x3½	1045	1045	....	....	....
Severin Six	Cont	6-3½x5¼	122½	33x4½	1485	1485	....	2100	2250
Severin Six	Cont	6-3½x5¼	122½	33x5	2550	2550	2550	3250	3350
Sheridan 4	Nort	4-3⅛x5¼	116	33x4	1485	1485	....	2060	2360
Skelton 35	Lyc	4-3½x5	112	32x3½	995	995	....	....	....
Southern Six 660-2	H-S	6-3¼x5	127	32x4½	2875	2875	2995	....	....
Standard J	Own	8-3¼x5	127	34x3½	3400	†3400	3400	4500	4800
Stanley Steamer	Own	2-4 x5	130	34x4½	2800	2600	2600	3775	3850
Stanwood Six	Cont	6-3¼x4½	118	33x4	2050	2050	....	2950	....
Stearns SKL4	Own	4-3⅝x5⅝	125	34x4½	2550	2450	2675	3400	3700
Stephens 90	Own	6-3½x4½	122	33x4½	1900	†1985	2065	3100	3100
Stevens Duryea E	Own	6-4½x5½	138	35x5	8500	†8000	8000	9500	9500
Studebaker EJ-40	Own	6-3⅜x4½	112	32x4	1300	1335	....	1695	1995
Studebaker EH-50	Own	6-3½x5	119	32x4	1585	1635	†1635	2450	2550
Studebaker EG-60	Own	6-3⅞x5	126	33x4½	....	....	1985	....	....
Stutz	Own	4-4½x6	130	32x4½	3250	†3350	*3350	4800	....
Templar A-445	Own	4-3⅝x5½	118	32x4	2385	2385	....	3185	3185
Texan A-38	Lyc	4-3½x5	115	33x4	1195	1195	....	....	....
Texan C-12	H-S	4-3½x5	115	33x4	1350	1350	....	....	....
Tulsa E-1-2-3	H-S	4-3½x5	117	33x4	1285	1285	....	....	....
Velie 48	Cont	6-3¼x4½	115	32x4	1585	1585	†1800	2485	2485
Velie 34	Falls	6-3⅛x4¼	112	32x3½	1385	1385	....	....	2085
Vogue 6-55	H-S	6-3¼x5	124	32x4	....	1885	1960	2785	2885
Vogue 6-66	Cont	6-3½x5¼	124	33x4½	....	2085	2160	2885	2985
Washington	Falls	6-3⅛x4¼	116	32x4	....	1685	....	....	....
Wasp 2611	Wisc	4-4¾x5½	132	33x5	....	†5500	....	....	....
Westcott C-48	Cont	6-3½x5¼	125	32x4½	....	....	2990	....	4590
Westcott C-38	Cont	6-3¼x4½	118	33x4	2290	2290	†2290	3390	3390
Wharton A	Curt	8-4 x5	136	34x4½	....	†4885	4885	....	....
Wills Sainte Claire	Own	8-3¼x4	121	32x4½	2875	2875	....	3750	4100
Willys-Knight 20	Own	4-3⅝x4½	118	33x4	1895	1895	....	2550	2750
Winther 61	H-S	6-3¼x5	120	32x4½	....	....	2750	....	....
Winton 25	Own	6-3¾x5¼	132	35x5	4600	†4975	4600	5950	†5950

*—6-passenger. †—4-passenger. ‡—3-passenger. **—Price without starter and demountable rims. Price with starter and demountable rims $465. ††—Price without starter and demountable rims. Price with starter and demountable rims $510.

Engine Make: Anst.—Ansted. Cont—Continental. Curt—Curtiss. D.Ly—Dort Lycoming. Dues.—Duesenberg. GBS—Golden, Belknap & Swartz. H-S—Herschell-Spillman. LeR—Leroi. Lyc—Lycoming. Nort—Northway. Roch—Rochester. Rut—Rutenberg. Supr—Supreme. Tee—Teetor. Weid—Weidely. Wisc—Wisconsin. §Model 47—34 x 4½ Tires.

Specifications of Current Motor Truck Models

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Acason	¾	$1650§	3¾x5	34x5†	34x5†	W
Acason, R	1	2260	3¾x5¼	36x3½	36x5	W
Acason, RB	1½	2485	3¾x5¼	36x3½	36x6	W
Acason, H	2½	3295	4⅜x5¾	36x4*	36x4d*	W
Acason, L	3½	4295	4⅜x5¾	36x5*	36x5d*	W
Acason, M	5	5250	5 x6¼	36x6	40x12	W
Ace, C	1½	2295	3¾x5½	34x3½*	34x5*	W
Ace, A	2½	2795	4¼x5½	36x4*	36x7	W
Acme, G	¾	....	3¾x5	35x5†	35x5†	W
Acme, B	1	....	3¾x5	34x3½	34x5	W
Acme, F	1½	....	3¾x5	34x3½	34x5	W
Acme, A	2	....	4½x5¼	36x4	36x7	W
Acme, C	3½	....	4½x5½	36x5	40x10	W
Acme, E	5	....	4¾x6	36x6	40x12	W
Akr'n Multi-Trk 20	1	1995	4 x5¼	34x5	34x5	B
All-Power, C	3½	5800	4½x6	36x7	36x10	W
All-American, B-1	1	1795	3½x5	32x4	32x4	I
All-American C-1	1½	2195	3½x5	34x4	34x5	I
American, 25	2½	3350	4 x6	36x4*	36x4d*	W
American, 40	4	4275	4½x6	36x5*	36x5d*	W
Apex, G	1	1675	3½x5	33x5†	33x5†	I
Apex, D	1½	1915	3¾x5⅛	34x3½	34x4	I
Apex, E	2½	2695	4¼x5½	36x4	36x7	I
Apex, F	3½	3975	4½x6	36x5	36x10	I
Armleder, 20	1	....	3¾x5¼	34x3½*	34x5*	W
Armleder, HW	2½	....	4¼x5½	36x4*	36x7*	W
Armleder, KW	3½	....	4½x6	36x5	36x5d	W
Atco, B	1½	....	3¾x5¼	34x5†	36x6*	I
Atco, B1	1½	....	3¾x5¼	34x5†	36x6†	I
Atco, A	2½	....	4¼x5½	36x4†	36x8*	W
Atlas, M.D	1	....	3½x5	32x4½†	32x4½†	W
Atterbury, 20R	1½	2775	3¾x5	34x3½	34x5	W
Atterbury, 7CX	2½	3375	4½x5¼	36x4	36x4d	W
Atterbury, 7D	3½	4175	4½x5½	36x5	40x5d	W
Atterbury, 8E	5	5575	4¾x6	36x5	40x6d	W
Autocar, 21UF	1½-2	2300	4¾x4½*	34x4*	34x5*	D
Autocar, 21UG	1½-2	2400	4¾x4½*	34x4*	34x5*	D
Autocar, 26Y	....	4350	4¼x5½	34x5	36x10	D
Autocar, 26-B	....	4500	4¼x5½	34x5	36x10	D
Available, H1½	1½	2750	4 x5⅛	36x3½*	36x5*	W
Available, H2½	2½	3475	4 x5⅛	36x4*	36x8*	W
Available, H3½	3½	4475	4½x5½	36x5	40x5d	W
Available, H5	5	5375	4¾x6	36x6	40x12	W
Available, H7	7	6000	5 x6	36x6	40x14	B
Avery	1	....	3 x4	34x5†	34x5†	I
Beck, A. Jr.	1	1800	3¾x5	34x3½	34x4	I
Beck, C	2	2550	4½x5½	36x4	36x6	I
Bell, M	1	1650	3⅝x5½	35x5	35x5†	I
Bell, E	1½	2250	3¾x5¼	34x3½	34x5†	I
Bell, O	2½	2750	4¼x5½	34x4	34x6	I
Belmont, D	2	2675	3¾x5	34x3½*	34x6*	D
Belmont, F	3½	3525	4 x6	36x5*	36x5d*	D
Bessemer, G	1	1395	3½x5	35x5†	35x5†	I
Bessemer, H-2	1½	1995	3¾x5	36x3½	36x5	I
Bessemer, J-2	2½	2595	4½x5½	36x4	36x4	I
Bessemer, K-2	4	3495	4½x5½	36x6	36x10	I
Bethlehem, K	1	....	3½x5	34x4½†	35x5	I
Bethlehem, G	2	....	4 x5¼	34x3½*	34x6*	I
Bethlehem, H	3	....	4 x5¼	36x4*	36x8	I
Bethlehem, J	4	....	4½x5½	36x5*	36x5d*	I
Bollstrom, 30	1½	2100	3¾x5¼	34x3½	34x6	I
Bollstrom, 50	2½	2800	4¼x5½	36x4	36x8	I
Bollstrom, 70	3½	3800	4½x6	36x5	36x10	I
Bollstrom, A-20	4	6000	5¾x7	40x8†	40x8†	I
Bollstrom, B21	4	5050	4½x5½	36x7	36x7	I
Bridgeport, A	1½	2350	3¾x5¼	34x3	34x6	W
Bridgeport, B	2½	2850	4¼x5½	36x4*	36x7*	W
Bridgeport, C	4	3650	4½x6	36x5	36x5d	W
Bridgeport, D	6	4500	4½x6	36x6	36x6d	W
Brinton, F	2½	3400	4½x5¼	36x4	36x7	W
Brockway, E	¾	1675	3¾x5	35x5†	35x5†	B
Brockway, S-4	1½	2250	3¾x5	36x3½*	36x5*	W
Brockway, K-5	2½	3200	4½x5½	36x4	36x7	W
Brockway, R-4	3½	4100	4½x5½	36x5	36x5d	W
Brockway, T	5	5250	4¾x6	36x6	40x6d	W
Capitol, G1½	1½	2975	3¾x5	35x5	38x7	W
Capitol, H2½	2½	3700	4¼x6	36x4	36x8	W
Capitol, K2½	2½	4250	4¼x6	36x6	42x9	W
Capitol, M3½	3½	4425	4¼x6	36x5	36x10	W
Case, ††	2	3000	4¼x5¾	36x6	38x7	I
Champion Light Commercial	½	1195	3½x5	32x3½	32x3½	I
Chevrolet, G	¾	820	3¼x4	31x4†	34x4½†	B
Chevrolet, T	1	1225	3½x5¼	33x4†	35x5†	W
Chicago, C1½	1½	....	3¾x5⅛	36x3½*	36x5*	W
Chicago, C2½	2½	....	4 x5⅛	36x4*	36x7*	W
Chicago, C3½	3½	....	4½x5½	36x5	36x10	W
Chicago, D5	5	....	4½x5½	36x6	40x12	W
Climber, A 20	1½	2450	3½x5	36x6*	38x7*	I
Clydesdale, 18	¾	1890	3¾x5	34x5	34x5	W
Clydesdale, 32C	1	2375	3¾x5½	34x3½*	34x5*	W
Clydesdale, 42C	1½	2475	4 x5⅛	36x3½	36x5	W
Clydesdale, 65C	2½	3250	4¼x5½	36x4	36x7	W
Clydesdale, 65EC	2½	3450	4½x5½	36x4	36x7	W
Clydesdale, 90C	3½	4100	4½x5½	36x5	40x10	W
Clydesdale, 120C	5	4500	4¾x6	36x6	40x12	W
Collier, 18	1	2350	3¾x5	34x4	34x5	W
Collier, 19	1½	2550	3¾x5	36x4	36x6	W
Collier, 21	2	2950	4½x5¼	36x4	36x7	W
Collier, 22	2½	3250	4½x5¼	36x4	36x4	W
Columbia, H	1½	2350	3¾x5	35x5†	34x5	I
Columbia, G	2½	2850	4 x5¼	36x4	36x7	I
Comet	1½	1950	3¾x5	34x4	34x4	W
Commerce, T	¾-1½	1450	3¾x5	34x4½†	34x4½†	B
Commerce, 12	1½	1800	3¾x5	35x5†	35x5†	I
Commerce, 16	2	2150	3¾x5	35x5†	35x6†	I
Concord, A	1½	2700	4 x5½	36x3½	36x6	W
Concord B	2½	3600	4¼x5½	36x4	36x8	W
Concord AX	1½	3150	4 x5½	36x3½	36x6	W
Concord, BX	2½	$3600	4½x5½	36x4	36x8	W
Cook, 4I	2	3000	4 x5½	36x6†	38x7†	I
Corbitt, E	1	2200	3¾x5	34x3½	34x4	W
Corbitt, D	1½	2600	3¾x5	36x3½	36x5	W
Corbitt, C	2	3150	4¼x5¼	36x3½	36x7	W
Corbitt, B	2½	3300	4½x5¼	36x4	36x7	W
Corbitt, A	3½	4100	4½x5½	36x5	36x10	W
Corbitt, AA	5	5000	4¾x6	36x6	40x6d	W
Cyclone A	1½	2685§	3½x5	34x5†	36x6†	I
Dart, S	1½	....	3¾x5¼	34x3½	34x6	W
Dart, M	2½	....	4¼x5½	36x4	36x7	W
Dart, W	3½	....	4½x6	36x5	36x10	W
Day-Elder, A	1	2225	3¾x5	34x3½	34x4	W
Day-Elder, B	1½	2300	3¾x5	34x3½	34x5	W
Day-Elder, D	2	2900	4¼x5¼	36x4*	36x7	W
Day-Elder, C	2½	2750	4¼x5	36x4	36x7*	W
Day-Elder, F	3½	3700	4½x5½	36x5*	36x5d*	W
Day-Elder, E	5	4875	4½x6	36x5	36x6d	W
Dearborn, F	1½	2180	3¾x5¼	34x4*	34x5*	W
Dearborn, 48	2	2590	3¾x5½	35x5†	34x7†	W
Defiance, G	1	1975	3¾x5	35x5†	35x5†	I
Defiance, D	1½	2550	3¾x5	35x5†	36x6†	I
Defiance, E	2	2750	3¾x5	35x5†	38x7†	I
DeKalb, E2½	2	2600	4½x5¼	36x4*	36x6*	W
DeKalb, E2	2½	2250	4½x5¼	34x3½*	36x5*	W
DeMartini 1½	1½	2600	3¾x5	34x3½	34x6	W
DeMartini 2	2	3300	4 x5½	36x3½	36x7	W
DeMartini 3	3	4250	4¼x5½	36x4	36x10	W
DeMartini 4	4	4800	4½x6	36x5	36x12	W
Denby, 12	1	1625	3¾x5	35x5	36x6	I
Denby, 33	1½	2300	3¾x5	35x5†	38x7†	I
Denby, 134	2	2600	3¾x5	36x3½	36x6	I
Denby, 25	3	3300	4¼x5¼	36x4	36x7	I
Denby, 27	4	4200	4½x5½	36x5	36x5d	I
Denby, 210	5	4850	4½x5½	36x6	40x6d	I
Dependable, A	¾-1	1650	3½x5	34x5	36x6	W
Dependable, C	1½	2350	3¾x5¼	34x3½	34x5	W
Dependable, D	2	2650	4 x5½	34x5	36x6	W
Dependable, E	2½	2950	4¼x5½	36x4	36x7	W
Dependable, G	3½	3550	4½x6	36x6	38x7	W
Diamond-T, O	1	2500	3¾x5¼	34x5†	36x6†	W
Diamond-T, FS	1½	2960	3¾x5¼	36x3½	36x5	W
Diamond-T, T	1½	2650	3¾x5¼	36x3½	36x5	W
Diamond-T, U	2	3285	4 x5¼	36x4	36x7	W
Diamond-T, K	3½	4675	4¼x5½	36x5	36x5d	W
Diamond-T, EL	5	5400	4½x5½	36x6	40x6d	W
Diamond-T, S	5	5650	4¾x6	36x6	40x6d	W
Diehl, A	1	....	3½x5	34x4½	35x5	I
Diehl, B	1½	....	3½x5	36x6	36x6	I
Dispatch, F	1	1350	3¾x5	34x4†	34x4†	I
Doane	2½	4100††	4¼x5¾	36x5	36x7	C
Doane	3½	5100††	4⅝x5¾	36x5	36x5d	C
Doane	6	6000††	4¾x6¾	36x6	40x6d	C
Dodge Brothers	½	1035††	3⅞x4½	33x4†	33x4†	B
Dorris, K-4	2	3400	4¼x5½	36x4	36x7	W
Dorris, K-7	3½	4400	4¼x5½	36x5	36x10	W
Double Drive B	3	4000	4¼x5½	6	6	W
Douglas G	1½	2050	3¾x5½	36x5	37x8*	W
Douglas I	3	3250	4¼x5½	36x6	37x8*	W
Duplex, A	1½	2775	4 x5¼	35x5†	38x7†	W
Duplex, E	3½	4250	4¼x5½	36x8	36x8	I
Duty, 21	2	1490	3½x5	34x3½	34x5	I
Eagle, 100-2	2	2275	3¾x5¼	34x4*	34x7*	I
Erie, A	2½	....	4¼x5½	36x4	36x4d	W
F.W.D., B	3	4200	4¾x5½	36x6	36x6	B
Facto, 1921	2½	2895	4¼x5½	36x4*	36x8*	W
Fageol, 1½	1½	3000	3¾x5¼	34x3½*	34x6*	W
Fageol, 2½	2½	3900	4¼x5¾	34x4	36x7	W
Fageol 3½	3½	5000	4½x6¼	36x5*	40x5d*	W
Fageol, 5	5	5700	4½x6¼	36x6	40x6d	W
Famous, B10	1	1800	3½x5	36x3½*	36x4*	I
Famous, B12	1½	2100	3¾x5	36x3½*	36x5*	I
Fargo, R	2	2500	3¾x5	36x4	36x6	I
Federal, SD	1	2500	3¾x5	35x5†	36x6†	W
Federal, TE	1½	2725	4¼x5¼	36x3½	36x5	W
Federal, UE	2	3025	4¼x5¼	36x4	36x7	W
Federal, WE	3½	3950	4½x5½	36x5	36x5d	W
Federal, X2	5-6	5350	4¾x6	36x6	40x6d	W
Ford, TT	1	495	3¾x4	30x3½*	32x4½*	W
Forschler, A	1	....	3½x5	34x3	34x4	W
Forschler, AX	1½	....	3½x5	36x3½	36x5	W
Forschler, B	2	....	4¼x5¼	36x4	36x7	W
Forschler, BX	3	....	4¼x5¼	36x4	36x8	W
Front Drive C	1½	2800	3¾x5½	5	4	W
Fulton, A	¾	1750	3½x5	35x5†	35x5†	B
Fulton, C	2	2350	3½x5	34x4	34x6	I
G & J**	2	3850	4x5¼	36x4	36x7	W
G & J**	3½	5175	4½x5½	36x5	36x5d	W
G.M.C., K15	¾	....	3½x5½	33x4½†	33x4½†	B
G.M.C., K16	1	....	3½x5½	34x5†	34x5†	B
G.M.C., K41	2	....	4 x5½	36x4*	36x7*	W
G.M.C., K71	3½	....	4½x6	36x5	40x5d	W
G M.C., K101	5	....	4½x6	36x5	40x6d	W
G.W.W.	1½	2100	3¾x5½	35x5	35x5	I
Garford, 15	¾	1590	3¾x5½	34x5†	34x5†	W
Garford, 25	1¼	2000	3¾x5½	36x3½	36x4	W
Garford, 70-H	2	3190	4½x5½	36x4	36x7	W
Garford, 68D	5	5200	5 x6½	36x6	40x6d	W
Garford, 77D	3½	4390	4½x6	36x5	36x6d	W
Garford, 150-A	7½	5500	5x6½	36x6	40x7d	C
Gary, F	1	2100	3¾x5	36x3½	36x4	W
Gary, I	1½	$2550	4 x5½	36x3½	36x5	W
Gary, J	2½	3150	4¼x5½	36x4	36x7	W
Gary, K	3½	4050	4½x6	36x5	40x5d	W
Gary, M	5	5150	5 x6½	36x6	40x6d	W
Gersix M	1½	3100	4 x5½	36x3½	36x7	W
Gersix K	2½	3500	4½x5½	36x4	36x8	W
Gersix	3½	4500	4½x6	36x5	40x12	W
Giant, 15-A	1½	2250	3¾x5	34x3½	34x5	W
Giant, 16	2	3050	4½x5¼	36x4	36x7	W
Giant, 17	3½	4150	4½x5½	36x5	36x5d	W
Globe D-20	¾	1495	3¾x5	33x4½†	33x4½†	B
Globe	1	1495	3¾x5	33x5	33x5	B
Golden West, GH	3	5000	4½x6	36x7	36x7	W
Golden West, G	3½	4500	4½x5½	36x6	36x6	W
Golden West, H	3½-4	5000	4½x6	36x6	36x6	W
Golden West, T	4	5500	4¾x6	36x6	36x6	W
Golden West, K	7	6000	5½x6	36x6	36x6	W
Golden West, HA	7	6000	4½x6	36x6	36x10	W
Gove, A-1	2½	....	4½x5¼	36x4*	36x7*	I
Graham Bros. A	1½	2495	3¾x5	35x5†	36x6†	I
Gramm-Bern., 10	1	1495§	3½x5	33x5†	33x5†	B
Gramm-Bern., 15	1½	2050§	3¾x5	36x3½*	36x5*	I
Gramm-Bern., 65	1½	2725§	3¾x5	36x3½*	36x5	W
Gramm-Bern., 20	2	3175§	4½x5¼	36x4*	36x7*	W
Gramm-Bern., 25	2½	3575§	4¼x5½	36x4*	36x4d*	W
Gramm-Bern., 35	3½	4375§	4½x5½	36x5	40x5d*	W
Gramm-Bern., 50	5	5275§	4¾x6	36x6	40x6d*	W
Hahn, J4	1	....	3¾x5	34x5*	34x5*	W
Hahn, CD	1½	....	4½x5¼	36x3½*	36x6*	W
Hahn, EE	2½	....	4½x5½	36x4*	36x8*	W
Hahn, F	3½	....	4½x5½	36x5*	36x10*	W
Hahn, EF	5	....	4¾x6	36x6	40x12	W
Hal Fur, E	1	2350	4 x5	35x5†	35x5†	W
Hal Fur, B	2½	3250	4¼x5½	35x5*	38x7*	W
Hal Fur, F	3½	4250	4½x5½	36x6†	40x10†	W
Hall	1½	3100	3¾x5	34x5†	38x7†	W
Hall	2½	3275	4½x5¼	36x4	36x6	W
Hall	3½	4100	4½x5½	36x5	36x5d	W
Hall	5	5100	4½x5½	36x5	40x6d	W
Hall	7	5100	4½x5½	36x5	40x6d	C
Harvey, WEA	1½	2550	4½x5½	34x3½	34x5	W
Harvey, WFA	2½	3300	4¼x5½	36x4	36x7	W
Harvey, WHA	3½	4300	4½x6	36x5	36x5d	W
Harvey, WKA	5	5200	4½x6	36x6	40x6d	W
Hawkeye, K	1½	1850	3¾x5¼	34x3½*	34x5*	I
Hawkeye, M	2	2650	4¼x5½	36x4*	36x6*	I
Hawkeye, N	3½	3700	4½x6	36x5*	36x10*	I
Hendrickson, N	2½	3150	4¼x5¾	36x4*	36x7*	W
Hendrickson, M	3½	3975	4¼x5¾	36x5*	36x5d*	W
Highway, Knight A	4	....	4 x6	36x5	36x6d	W
Highway, Knight B	5	....	4 x6	36x5	40x6d	W
Higrade, A17	¾	1850	3½x5	32x4½	32x4½	W
Higrade, A18	1	2100	3½x5	35x5†	35x5†	W
Higrade, B20	1½	2500	4½x5¼	35x4†	36x6†	W
Huffman, B	1½	1995	3¾x5	34x3½	34x6	W
Huffman, C	1½	1795	3¾x5½	34x3½	34x6	I
Hurlburt	1½	....	4 x5½	34x4	34x5	W
Hurlburt	2½	....	4½x5½	36x4	36x4d	W
Hurlburt	3½	....	4½x6	36x5	36x5d	W
Hurlburt	5	....	4½x6	36x5	40x6d	W
Huron Erie	1½	2425	3¾x5¼	36x3½	36x5	I
Huron Mich.	2½	2950	4¼x5½	36x4	36x7	I
Indep'd't (Iowa), B	1	1665	3½x5	34x3½	34x4	W
Indep'd't (Iowa), G	1½	2040	3¾x5¼	34x3½	34x5	I
Indep'd't (Ia.), H.L	2½	2940	4½x5¼	34x4	34x6	I
Indep'd't (Ohio), F	1½	2585	3¾x5	36x3½	36x5	W
Indep'd't (Ohio) H	2½	3285	4½x5¼	36x4	36x4d	W
Indep'd't (Ohio) K	3½	4285	4½x5½	36x5	36x5d	W
Indiana, 12	1¼	2290	3¾x5¼	34x3½*	34x5*	W
Indiana, 20	2	2950	4½x5½	36x4*	36x7*	W
Indiana, 25	2½	3150	4½x5½	36x4*	36x8*	W
Indiana, 35	3½	3750	4½x5½	36x5*	36x5d*	W
Indiana, 51	5	4795	5 x6¼	36x5*	40x6d*	W
Inland, D	2	2950	4 x5	34x5	34x6	I
International, S	¾	1500	3½x5	34x5†	34x5†	I
International, 21	1	1750	3½x5¼	36x3½	36x3½	I
International, 31	1½	1850	3½x5¼	36x3½	36x4	I
International, 41	2	2100	3½x5¼	36x3½	36x5	I
International, 61	3	2400	4¼x5	36x4*	36x6*	I
International, 101	5	3600	4¼x5	36x5	40x10	I
J & J, D	2	3250	4 x5	34x4*	34x6	I
Jackson, 4WD	3½	4550	4½x5½	36x7	36x7	B
Jumbo, 15	1½	2425	3¾x5¼	36x3½	36x5	I
Jumbo, 20	2	2675	3¾x5¼	35x5†	38x7†	I
Jumbo, 25	2½	3090	3¾x5¼	36x4	36x7	I
Jumbo, 30	3	3590	4¼x5½	36x6†	42x9†	I
Jumbo, 35	3½	4080	4½x6	36x5	36x10†	I
Jumbo, 40	4	4730	4 x6	38x7†	44x10	I
K-Z, 1	1	2250	3½x5	34x3½	34x5	W
K-Z, 1½	1½	2750	3¾x5	36x4	36x6	W
K-Z, 2½	2½	3250	4½x5¼	36x4	36x8	W
K-Z, 3½	3½	4250	4½x5½	36x5	40x10	W
K-Z, 5	5	5200	4½x5½	36x6	40x6d	W
Kalamazoo, G-1	1½	2495	3¾x5	34x4	34x5	W
Kalamazoo, G-2	1½	2800§	3¾x5	36x5	36x6	W
Kalamazoo, H	2½	3275§	4 x6	36x4	36x8	W
Kalamazoo, K	3½	4000§	4¼x6	36x5	36x10	W
Kalamazoo, K-5	5	4500§	4½x6	36x6	36x6d	W
Karavan, A	2½	3900	4¼x6	36x4	36x8	W
Kearns, H	¾	1600	3½x4½	32x4½†	32x4½†	I
Kearns, N	1½	2200	3½x5	34x3½	34x6	I
Kelly-Springfield K-31	1½	2900	3¾x5¼	36x3½	36x6	C
Kelly-S., K-34	1½	2900	3¾x5¼	36x3½	36x6	W
Kelly-S., K-36	2½	3250	3¾x5¼	36x4	36x4d	W
Kelly-S., K-35	2½	3250	3¾x5¼	36x4	36x4d	C
Kelly-S., K-40	3½	4200	4½x6½	36x5	40x5d	C
Kelly-S., K-41	3½	4200	4½x6½	36x5	40x5d	I
Kelly-S., K-42	3½	4200	4½x6½	36x5	40x5d	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††—Price includes body. §—Price includes several items of equipment.

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Kelly-S., K-45	4	$4550	4½x6½	36x5	40x6d	C
Kelly-S., K-50	5	4900	4½x6½	36x6	40x6d	C
Kelly-S, K-60	6	5100	4½x6½	36x6	40x7d	C
Keystone, 40	2	2450	3¾x5½	34x5†	38x7†	I
Kimball, AB	2	3675	4 x6	36x4	36x7	W
Kimball, AC	2½	3975	4¼x6	36x4	36x8	W
Kimball, AK	3	4500	4½x6	36x4	36x10	W
Kimball, AE	4	5000	4¾x6	36x5	40x12	W
Kimball, AF	5	5975	5 x6	36x6	40x7d	W
Kissel, Express	1	1985††	3½x5½	34x5†	34x5†	W
Kissel, Utility	1½	2775	3½x5½	36x3½	36x5	W
Kissel, Freighter	2½	3475	4¼x5½	36x4	36x7	W
Kissel, H. D.	4	4475	4¼x5½	36x5	36x5d	W
Kleiber, AA	1	2600	4½x5½	34x3½*	34x5*	W
Kleiber, A	1½	3100	4½x5¼	36x3½*	36x6*	W
Kleiber, BB	2	3600	4½x5¼	36x4*	36x7*	W
Kleiber, B	2½	4200	4½x5½	36x5*	36x8	W
Kleiber, C	3½	4900	4½x5½	36x5	36x5d	W
Kleiber, D	5	5600	5 x6½	36x6	40x12	W
Koehler, D	1½	....	3½x5	34x3½	34x5	W
Koehler, M	2½	....	4 x5½	36x4	36x7	W
Koehler, MCS	2½	....	4 x5½	36x4	36x7	W
Koehler, F	3½	....	4½x5½	36x5	36x10	W
Koehler,MT, Trac	5	....	4 x5½	36x4	36x7	W
L.M.C., 2-20	2½	2540	4½x5¼	36x4	36x4d	I
Lange, B	2½	3350	4¼x5¼	36x4*	36x6*	C
Larrabee, U	1½	2400	3¾x5	34x3½	34x5	W
Larrabee, SK	2½	3200	4¼x5¼	36x4	36x7	W
Larrabee, FL	3½	4000	4½x5½	36x5	36x5d	W
Larrabee, FW	5	4800	4¾x6	36x6	40x6d	W
Lion, L	1	2350	3¾x5½	35x5†	35x5†	W
Luedinghaus, C	1	2100	3½x5	35x5†	35x5†	W
Luedinghaus, W	1½	2700	3¾x5¼	34x3½	34x5*	W
Luedinghaus,	2-2½	3150	4¼x5¾	36x4*	36x7*	W
Maccar, L	1½	2025	4¼x5¼	36x4	36x6	W
Maccar, H-2	2½	3650	4½x5½	36x1	36x4d	W
Maccar, M-2	3½	4500	4½x6	36x5	36x5d	W
Maccar, G	5	5500	4¾x6	36x5	40x6d	W
MacDonald, A	7½	5750	4½x6	40x7	40x14	I
Mack, AB D.R.	1½	3450	4 x5	36x4	36x3½d	D
Mack, AB	2½	3400	4 x5	36x4	36x4d	C
Mack, AB Chain	2	3000	4 x5	36x4	36x3½d	C
Mack, AB Chain	3	3300	4 x5	36x4	36x4d	C
Mack, AB D.R.	2	3750	4 x5	36x4	36x4d	D
Mack, AC Chain	3½	4950	5 x6	36x5	40x5d	C
Mack, AC Chain	5	5500	5 x6	36x6	40x6d	C
Mack, AC Chain	6½	575\	5 x6	36x6	40x12	C
Mack, AC Chain	7½	6006	5 x6	36x7	40x7d	C
Mack Trac., AB	5	3406	4 x5	36x4	36x4d	C
Mack Trac., AC	7	4950	5 x6	36x5	40x5d	C
Mack Trac., AC	10	5500	5 x6	36x6	40x6d	C
Mack Trac., AC	13	5750	5 x6	36x6	40x12	C
Mack Trac., AC	15	6000	5 x6	36x7	40x7d	C
Mapleleaf, AA**	2	4150	4 x5½	36x4	36x7	W
Mapleleaf, BB**	3	4775	4¼x5½	36x4	36x4d	W
Mapleleaf, CC**	4	5770	4½x5½	36x5	36x5d	W
Mapleleaf, DD**	5	6825	4½x5½	36x6	40x6d	W
Master, JW	1½	2690	4½x5½	34x3½	34x5	W
Master, W	2½	3290	4¼x5½	34x4	36x7	W
Master, D	2½	3540	4¼x5½	34x4	36x7	D
Master, A	3½	4190	4½x6	36x5	40x5d	W
Master, E	3½	4640	4½x6	35x5	40x5d	D
Master, B	5	5290	4¾x6½	36x6	40x6d	W
Master, F	5	5440	4¾x6½	35x5	40x6d	D
Master Trac., T	6	3740	4¼x5½	36x7	36x4d	D
Maxwell, 1½	1½	1332	3½x4¼	32x3	32x4	W
Menominee, HT	1	2080	3¾x5	34x3½	36x5	W
Menominee, H	1½	2725	4 x5	36x3½	36x5	W
Menominee, D	2	3245	4 x6	36x4	36x8	W
Menominee, G	3½	4270	4½x6	36x5	36x10	W
Menominee, J3	5	5450	4¾x6	36x6	40x12	W
Moline, 10	1½	2450	3½x5	34x5†	36x6†	I
Moreland, 20N	1	2850	3¾x5	35x5†	36x6†	I
Moreland, 21B	1½	2800	4½x5¼	36x3½	36x6	W
Moreland, 21C	2½	3500	4½x5½	36x4	36x8	W
Moreland, 21H	3½	4600	4¾x6	36x5	40x5d	W
Moreland, 21J	5	5000	4¾x6	36c6	40x6d	W
Mutual, 2B	2	3450	4 x6	36x4	36x8	W
Mutual, 2BP	2½	4150	4 x6	38x7†	42x9†	W
Napoleon, 7	¾-1	1350	3½x5	38x4	33x4†	I
Napoleon, XX-7	1	1535	3½x5	35x5*	35x5*	I
Napoleon, 11	1½	1860	3½x5	35x5*	36x6*	I
Nash, 2018	1	1895	3¾x5¼	35x5	36x6	I
Nash, 3018	2	2550	3¾x5¼	36x6	40x8	I
Nash, Quad.	2	3250	4¼x5½	40x8	40x8	I
*Nelson, F1½	1½	....	4½x5¼	36x3½	36x5	W
*Nelson, F2	2	....	4½x5¼	36x4	36x7	W
*Nelson, F3½	3½	....	4½x5½	36x5	36x5d	W
*Nelson FC5	5	....	4¾x6	36x6	40x6d	W
Netco, D	2	3100	4¼x5¼	36x4*	36x7*	W
Netco, H	2½	3500	4½x5½	36x4*	36x8*	W
New York, M	1½	....	4½x5¼	36x3½	36x5	W
New York, N	2-2½	....	4½x5¼	36x4	36x4d	W
Niles, E	2	3000	4¼x5¼	36x4*	36x7*	W
Noble, B30	1½	2585	3¾x5¼	36x3½	36x5	W
Noble, C40	2	2825	4 x5½	36x4	36x7	W
Noble, D50	2½	3150	4¼x5½	36x4	36x8	W
Noble, E70	3½	4030	4½x6	36x5	36x10	W
Northway, B-2	2	3400	4 x6	36x4	36x4d	W
Northway, B-3	3½	4400	4 x6	36x5	40x5d	W
Northwestern W	2	3300	4½x5¼	34x4	36x6	W
Northwestern WS	2½	3500	4½x5½	36x4	36x8	W
Norwalk, 25E	1	1695	3½x5	34x3½	34x4	W
Norwalk, 35E	1½	2025	3½x5	34x3½	34x3½d	W
Norwalk,35E.Spec	1½	2285	3¾x5¼	34x3½	34x5	W
O. K., K1	1½	2675	4 x5½	36x3½†	36x5†	W
O. K., L1	2½	3450	4¼x5½	36x4	36x8	W
O. K., M1	3½	4250	4½x6	36x5	36x5d	W
Ogden, A1	1½	$2550	3¾x5	36x3½	36x5	W
Ogden, E	2½	3250	4½x5¼	36x4	36x7	W
Old Hickory, W	1	2175	3¾x5	36x3½*	36x4*	W
Old Reliable, A	1½	2350	4 x5	34x4	36x6	W
Old Reliable, B	2½	3500	4¼x6	34x4	36x4d	W
Old Reliable, C	3½	4250	4¼x6	36x5	36x5d	W
Old Reliable, D	5	5250	4¾x6	36x6	40x6d	W
OldReliable,KLM	7	6000	4¾x6¼	36x6	40x7d	C
Oldsmobile Econ.	1	1250	3½x5¼	35x5†	35x5†	I
Olympic, A	2½	3500	4¼x5½	36x4	36x7	W
Oneida, A-9	1¼	2350	3¾x5½	36x3½	36x5	W
Oneida, B-9	1¾	2915	4 x5¼	36x4	36x7	W
Oneida, C-9	2½	3390	4 x5¼	36x4	36x7	W
Oneida, D-9	3½	4345	4½x5½	36x5	36x10	W
Oneida, E-9	5	5460	4½x5½	36x6	40x12	W
Orleans, A	1½	2750	3¾x5⅛	36x3½	36x5	W
Orleans, B	2½	3250	4x5⅛	36x4*	36x7*	W
Orleans, C	3½	3750	4½x5½	36x4½	36x8	W
Orleans, D	5	4250	4½x5½	36x6	40x8	W
Oshkosh, A	2	3750	3½x5	36x6†	36x6†	4
Oshkosh, AA	2	3850	3½x5	36x6†	36x6†	4
Oshkosh, B	2½	4150	4 x5½	38x7†	38x7†	4
Oshkosh, BB	2½	4300	4 x5½	38x7†	38x7†	4
Packard, EC	....	3500	4½x5½	36x4	36x7	W
Packard, ED	....	4100	4½x5½	36x5	36x5d	W
Packard, EF	....	4500	5 x5½	36x6†	40x6d†	W
Packard, EX	....	4000	4⅞x5½	36x6†	40x8†	W
Paige, 52-19	1½	2880	4 x5¼	34x3½	34x6	W
Paige, 54-20	2½	3400	4¼x5½	34x4	34x4d	W
Paige, 51-18	3½	4285	4½x5½	36x5	36x5d	W
Parker ,F20	2	3500	4 x6	34x4	36x4d	W
Parker, J20	3½	4400	4½x6	36x5	40x5d	W
Parker, M20	5	5500	4¾x6	36x6	40x6d	W
Patriot, Revere	¾	1785	3¾x3	35x5†	35x5†	W
Patriot, Lincoln	1½	2450	4 x5¼	34x3½*	34x5*	W
Patriot, Washgt'n	2½	3450	4½x5½	36x4*	36x7*	W
Piedmont, 4-30	1½	1685	3½x5	34x4†	34x4†	W
Pierce-Arrow,	2	3200	4 x5½	36x4	36x4d	W
Pierce-Arrow	3½	4350	4½x6¾	36x5	36x5d	W
Pierce-Arrow	5	4850	4½x6¾	36x5	40x6d	W
Pioneer, 59	1	1550	3¾x4½	32x4½†	32x4½†	W
Pittsburger, B 21	2½-3	3800	4½x5¼	36x5*	36x7*	W
Pony	¼	400	2¾x4	28x3†	28x3†	C
Power, F	1½	....	3¾x5¼	36x6	36x6	W
Power, C	3½	....	4¼x5½	36x5	40x10	W
Premocar, B-143	1½	2475	3½x5	36x6†	36x6†	W
Rainier, R-11	¾	2150	3½x5	35x5†	35x5†	W
Rainier, R-19	1	2350	3½x5	34x3½	31x4	W
Rainier, R-16	1½	2600	3¾x5	34x3½	34x5	W
Rainier, R-18	2	2950	4½x5¼	34x4	34x6	W
Rainier, R20	2½	3600	4½x5¼	34x4	34x7	W
Rainier, R-15	3½	4500	4½x5½	36x5	36x5d	W
Rainier, R17	5	5250	4½x6	36x6	36x6d	W
Ranger, TK-20-2	2	....	3¾x5	36x6†	36x6†	W
Reo, F	¾-1½	1385	4½x4½	34x4½†	34x4½†	B
Reliance, 10A	1½	2400	4 x5½	36x3½	36x5	I
Reliance, 20B	2½	3100	4½x5½	36x4	36x4d	I
Republic, 75	¾	1395††	3½x5	32x4½	32x4½	I
Republic, 10	1	1695	3½x5	35x5†	35x5†	I
Republic,10Exp.†)	1	2095	....	35x5†	35x5†	I
Republic, 11X	1½	2295	3¾x5	34x3½	34x5	I
Republic, 19	2½	2795	4½x5¼	36x4	36x7	I
Republic, 20	3½	3845	4½x5½	36x5	36x10	I
Riker, B	3	4600	4¼x6	36x5	36x5d	W
Riker, BB	4	4800	4¼x6	36x5	36x6d	W
Rowe, CW	1½	3000	3¾x5	36x6†	36x6†	W
Rowe, C. D. W.	2	3300	4 x5	34x4	36x3½d	W
Rowe, G. S. W.	3	4150	4 x6	34x5	36x5d	W
Rowe, G. P. W.	3	5250	3½x5†	38x7†	42x9†	W
Rowe, HW	4	4500	4¼x6	36x5	36x6d	W
Rowe, F. W.	5	5500	4½x6	36x6	40x6d	W
Rumely, A	1½	2720	3¾x5¼	36x3½	36x5	W
Samson, KO 15	¾	....	3½x4	32x4	32x4	B
Samson, E 25	1¼	1395	3½x5½	35x5	35x5	B
Sandow, G	1	2295	3¾x5	34x3½	34x5	W
Sandow, CG	1½	2590	3¾x5	34x4	34x6	W
Sandow, J	2½	3275	4½x5¼	36x4	36x7	W
Sandow, M	3½	4295	4½x5½	36x5	36x5d	W
Sandow, L	5	4975	4½x5½	36x6	40x6d	W
Sanford, 25	2½	3350	4½x5¼	36x4	36x4d	W
Sanford, 35	3½	4200	4½x5½	36x5	36x5d	W
Sanford, 50	5	5100	4¾x6	36x5	40x6d	W
Schacht, 2-Ton	2	3550	4¼x5½	36x4	36x7	W
Schacht, 2½-Ton	2½	3850	4¼x5½	36x4	36x4d	W
Schacht, 3½-Ton	3½	4350	4¼x6	36x5	36x5d	W
Schacht, 5-Ton	5	5350	4½x6	36x5	40x6d	W
Schwartz, A	1	1685	3½x5	33x4½†	33x4½†	B
Schwartz, BW	1½	2600	3¾x5¼	34x3½*	34x7*	W
Schwartz, C.W.S.	2½	3200	4¼x5½	36x4	36x8	W
Schwartz, DW	5	4900	4½x6	36x6	40x12	W
Selden, 1½A	1½	2360	3¾x5	34x3½	34x5	W
Selden, 2½A	2½	3425	4½x5¼	36x4	36x7	W
Selden, 3½A	3½	4175	4½x5½	36x5	36x10	W
Selden, 5A	5	5600	4¾x6	36x6	40x12	W
Seneca, M	½	1020	3½x4½	30x3½†	30x3½†	B
Service, 15	¾-1	1840	3¾x5	34x4½	35x5	B
Service, 220	1	2415	3½x5½	34x3½	34x5	W
Service, 31	1½	2985	4 x5½	36x3½	36x6	W
Service, 36	1½	3415	4¼x5½	35x5†	38x7†	W
Service, 51	2½	3475	4¼x5½	36x4	36x7	W
Service, 71	3½	$4285	4¼x5½	36x5	36x5d	W
Service, 76	3½	4485	4½x6	36x5	36x5d	W
Service, 161	5	5275	4½x6	36x6	40x6d	W
Signal, NF	1	2475	4¾x5	34x5†	36x6†	W
Signal, H	1½	2925	4½x5¼	34x4	36x6	W
Signal, J	2½	3275	4½x5¼	34x4	36x8	W
Signal, M	3½	4275	4½x5½	36x5	40x5d	W
Signal, R	5	5300	4¾x6	36x6	40x6d	W
Southern, 10	1	2090	3¾x5	34x3½	34x4	W
Southern, 15	1½	2590	3¾x5½	36x6†	34x4	W
Southern, 20	2	2990	4¼x5¼	36x6†	40x8*	W
Standard, 1-K	1-1½	1950	3¾x5	34x3½*	34x5*	W
Standard, 76	2½-3	3100	4½x5¼	36x4*	36x7*	W
Standard, 66	3½-4	4000	4½x5½	36x5	36x10	W
Standard, 5-K	5-6	5250	4¾x6	36x6	40x12	W
Sterling, 1½	1½	3200	4 x5¾	36x3½	36xo*	W
Sterling, 2	2	3500	4 x5¾	36x4	36x6	W
Sterling, 2½	2½	3650	4⅜x5¾	36x4*	36x4d*	W
Sterling, 3½	3½	4650	4½x6¼	36x5*	40x5d*	W
Sterling, 5-W	5	5500	5 x6¼	36x6*	40x6d*	W
Sterling, 5-C	5	6000	5 x6¼	36x6	40x6d	C
Sterling, 7½	7½	6500	5 x6¼	36x6	40x7d	C
Stewart, 11	¾	1350	3½x4½	32x4†	32x4†	I
Stewart, 15	1	1875	3½x5	35x5†	35x5†	I
Stewart, 9	1½	2200	3¾x5	34x3½	34x5	I
Stewart, 7	2	2800	4½x5¼	34x4	34x7	I
Stewart, 7-X	2½	2950	4¼x5½	34x4	34x7	I
Stewart, 10	3½	3850	4½x5½	36x5	36x5d	I
Stewart, 10-X	3½	3850	4½x6	36x5	36x5d	I
Stoughton, A	1	1995	3¾x5¼	34x4½†	35x5†	W
Stoughton, B	1½	2350	3¾x5¼	36x3½	36x5	W
Stoughton, D	2	2800	4 x5⅛	36x4	36x7	W
Stoughton F	3	3600	4¼x5½	36x5.l	36x5d	W
Sullivan, E	2	3350	4¼x5½	36x4*	36x7*	W
Sullivan, H	3½	4650	4½x6	36x5	36x5d	W
Superior, D	1	1650	3¾x5	34x4½†	34x4	I
Superior, E	2	2600	4½x5¼	36x4	36x6	I
Super Truck, 50	2½	3300	4 x6	36x4	36x8	W
Super Truck, 70	3½	4300	4¼x6	36x5	40x5d	W
Super Truck, 100	5	5300	4¾x6	36x5	40x12	W
Super Truck 150	7½	6300	5 x6	36x6	40x7d	W
Texan, A38	¾	1095	3½x5	33x4	33x4	I
Texan, TK39	1½	1550	3½x5	36x6	38x7	W
Tiffin, GW	1½	2695	4½x5¼	36x3½	36x5	W
Tiffin, MW	2½	3580	4½x5½	36x4	36x3½d	W
Tiffin, PW	3½	4760	4½x5½	36x5	40x5d	W
Tiffin, F50	5	5850	4¾x6	36x6	40x6d	W
Tiffin, F60	6	6050	4¾x6	36x6	40x12	W
Titan, HT	3½	4550	4½x6	34x4*	40x5d	I
Titan, HD	5	5400	4½x6	36x5	40x6d	I
Titan, TS	2½	3400	4¼x5½	34x4*	36x4d	I
Tower, J	1½	3000	4½x5¼	35x5	38x7	W
Tower, H	2½	3475	4½x5¼	36x4	36x7	W
Tower, G	3½	4400	4½x5½	36x5	36x5d	W
Traffic, C	....	1595	3¾x5	34x3½*	34x5*	I
Transport, 20	1	1395	3¾x5⅛	34x3½	36x5	I
Transport, 30	1½	1995	3¾x5	36x3½	36x5	I
Transport, 50	2½	2785	4¼x5½	36x4	36x7	I
Transport, 70	3½	3885	4½x6	36x5	36x10	I
Traylor, B	1½	2500	3¾x5½	34x3½	34x5	W
Traylor, C	2	3000	4 x5½	36x4	36x7	W
Traylor, D	3	3500	4¼x5½	36x4	36x8*	W
Traylor, E	4	4700	4½x6	35x5	40x10	W
Traylor, F	5	5100	4½x6	36x6	40x6d	W
Triangle, AA	¾-1	1600	3¼x5	35x5†	35x5†	I
Triangle, A	1½	2350	3¾x5¼	34x3½*	34x6*	I
Triangle, C	2	2700	3¾x5¼	36x4*	36x6*	I
Triangle, B	2½	2950	4 x5¾	36x4*	36x7*	I
Triumph, G	1	1995	3¾x5½	34x5†	34x5†	W
Triumph, HC	1½	2550	3¾x5¼	36x3½	36x5	W
Triumph, HB	2	2900	3¾x5¼	36x4	36x7	W
Twin City, B.W.	2	3000	4 x5½	36x4	36x7	I
Twin City, A. W.	3½	4400	4¼x6	36x5	40x5d	W
Twin City, FWDB	3½	4750	5½x6	36x6	36x6	I
Twin City, FWDA	5	5250	5½x6	36x7	36x7	I
Ultimate, A	2	3200	4 x5½	36x3½*	36x6*	W
Ultimate, AJ	2	3250	4¼x5½	35x5†	38x7†	W
Ultimate, B	3	3750	4¼x5½	36x4*	36x4d*	W
Ultimate, BL	3	3850	4¼x5½	36x4*	36x4d*	W
Union, F W	2½	3490	4 x6	36x5*	36x8*	D
Union, H W	4	4485	4½x6	36x6	40x12	D
Union, J W	6	5800	5 x6	36x6	40x14	D
United, A	1½	2445	3¾x5¼	36x3½*	34x5*	I
United, B	2½	3150	4¼x5½	36x4*	36x7*	I
United, C	3½	3975	4¼x5½	36x5	36x5d	I
United, V	5	5000	4½x6	36x6	40x6d	I
U. S., N	1½	2475	3¾x5	36x3½*	36x5*	I
U. S., R	3	3795	4 x5¼	36x4	36x4d	W
U. S., S	4	4595	4½x5½	36x5	36x5d	W
U. S., T	6	5850	4¾x6½	36x6	40x6d	W
Velie, 46	1½	2200	3¾x5	36x3½	36x5	I
Veteran, E**	1-1½	3500	3¾x5½	35x5†	36x6†	W
Veteran, A**	2-2½	4000	4¼x5½	36x4*	36x7*	W
Veteran, D**	2½-3	4400	4¼x5½	36x4*	36x7*	W
Veteran, H**	3½-4	5600	4¼x6	36x5	36x5d	W
Victor, A	1½	2050	3¾x5	34x4	34x5	I
Vim, 29	½	1355	3½x4½	31x4†	31x4†	W
Vim, 30	½	1550	3½x4½	32x4½	32x4½	W
Vim, 31	1	2475	3¾x5⅛	35x5†	35x5†	W
Vim, 22	2	3150	3¾x5½	36x4	36x6	W
Vim, 23	3	3950	4¼x5½	36x5	36x5d	W
Vulcan, 25	2½	4000	4¼x6	36x4	36x8	W
Vulcan, 25P	3	4500	4¼x6	36x6	40x8	W
Walker-Johnson,B	2½	3500	4¼x5½	36x4	36x8	W
Walter, S	5	5600	4½x6¼	36x6	40x6d	D
Waltham, E	1½	2350	3¾x5¼	36x3½	36x5	W
Ward-LaF., 2B	2½	3590	4¾x5¾	36x4	36x7	W
Ward-LaF.,4A	3½	4690	4½x6¼	36x5	36x5d	W

*2-cyl, †6-cyl, ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††—Price includes body, ‡—Price includes several items of equipment.

*Nelson Le Moon

Specifications of Current Motor Truck Models—Continued

NAME AND MODEL	Tons Capacity	Chassis Price	Bore and Stroke	TIRES Front	TIRES Rear	Final Drive
Ward-LaF., 5A	5	$5590	5 x6¼	36x6	36x6d	W
Watson, E	1	1865	3¾x5¼	34x4½†	34x4½†	W
Watson, N	1½	4250	4½x5½	36x5	36x10	W
Western, W1½	1½	2550	4⅛x5¼	36x3½*	36x5*	W
Western, L1½	1½	2550	3¾x5	36x3½*	36x5*	W
Western, W2½	2½	3250	4¼x5¼	36x4	36x7	W
Western, L2½	2½	3250	4¼x6	36x4	36x7	W
Western, W3½	3½	4250	4½x6	36x5	40x5d	W
White, 15	¾	2400	3¾x5¼	34x5†	34x5†	B
White, 20	2	3250	3¾x5½	36x4*	36x7	D
White, 40	3½	4200	3¾x5¾	36x5	40x5d	D
White, 45	5	4500	4¼x5¾	36x6	40x6d	D
White Hick., E	1	2450	3¾x5	34x5†	34x5†	W
White Hick., H	1½	2750	3¾x5	36x3½	36x5	W
White Hick., K	2½	3350	4½x5¼	36x4	36x5	W
Wichita, K	1	2300	3¾x5¼	36x3*	36x4*	W
Wichita, L	1½	2600	3¾x5¼	36x3½*	36x5*	W
Wichita, M	2	2800	3¾x5¼	36x3½*	36x6*	W
Wichita, R	2½	3000	3¾x5¼	36x4*	36x7*	W
Wichita, RX	2½	3600	4¼x6	36x4*	36x8*	W
Wichita, O	3½	$4000	4¼x6	36x5*	36x5d*	W
Wichita, S	5	5000	4½x6	36x6	40x6d	W
Wilcox, AA	1	2100	3¾x5½	36x4*	36x4*	W
Wilcox, B	1½	2775	4¼x5	36x4	36x5	W
Wilcox, D	2½	3300	4¼x5	36x4*	36x3½d*	W
Wilcox, E	3½	4250	4½x6	36x5*	36x5d*	W
Wilcox, F	5	5200	4¾x6½	36x5	40x6d	W
Wilson, F	1½	2270	3¾x5	36x3½	36x5	W
Wilson, EA	2½	2825	4½x5¼	36x4	36x7	W
Wilson, G	3½	3685	4½x5½	36x5	36x5d	W
Wilson, H	5	4520	4¾x6	36x6	40x6d	W
Winther, 751	¾	1795	3½x5	34x4½†	35x5†	I
Winther, 430	1½	$2850	3¾x5	32x4	32x4	I
Winther, 39	1½	2450	3¾x5	34x3½	34x5	I
Winther, 49	2	3250	4 x5	34x4	34x4d	I
Winther, 70	3½	4200	4 x6	36x5	36x5d	I
Winther, 450	4	3690	4 x5	34x5	36x6	I
Winther, 109	5	5250	4½x6	36x6	40x5d	I
Winther, 140	7	5900	5 x6	36x6	40x7d	I
Wisconsin B	1	1950	4 x5¾	34x5†	34x5†	W
Wisconsin C	1½	2300	4⅜x5¾	36x6†	36x6†	W
Wisconsin D	2½	3500	4½x6½	36x6	36x10	W
Wisconsin E	3½	4000	5 x6¼	36x6†	36x12†	W
Witt-Will, N	1½	2750	3¾x5	36x3½*	36x5*	W
Witt-Will, P	2½	3250	4½x5¼	36x3½*	36x7*	W
Wolverine, J	1	2125	3½x5	34x3	34x4	I
Wolverine, J	1½	2375	3¾x5	34x3½	34x5	I
Wolverine, J	2	2640	3¾x5	34x4	34x7	I
Wolverine, J	2½	3425	4⅛x5¼	36x5	36x10	I
Wolverine, L	3½	4100	4½x5½	36x5	36x10	I
Yellow Cab M21	¾	2050	3¾x5	32x4	32x4	B
Yellow Cab M41	1¼	2350	3¾x5	34x4½	34x4½	W

*2-cyl. †6-cyl. ‡8-cyl. All others, not marked, are 4-cyl. Trac., Tractor. **Canadian made.

Final Drive: W—Worm, I—Internal Gear, C—Chains, D—Double Reduction, B—Bevel, 4—Four-Wheel, E—External Gear. *Tires—optional. †Pneumatic Tires. All others solid. ††—Price includes body. §—Price includes several items of equipment.

Farm Tractor Specifications and Prices

TRADE NAME	Rating	Price	Wheels or Crawlers	Engine	Cylinders: Bore, Stroke	Fuel	Plow Capacity
All-In One	16-30	$1975	3	Clim.	4-5 x6½	GDK	3-4
Allis-Chalm. B	6-12	925	2	LeR.	4-3⅛x4½	Gas.	1
Allis-Chal. G.P	6-12	850	2	LeR.	4-3⅛x4½	Gas.	1-2
Allis-Chalm.	12-20	1495	2	Mid.W	4 4⅛x5¼	Gas.	2-3
Allis-Chalm.	18-30	2150	4	Own	4-4¾x6½	GorK	3-4
Allis-Chalm	10-18	875	4	Own	4-4¾x6½	G,K	4
Allwork 2-G	14-28	1875	4	Own	4-4¾x6	GorK	3
Allwork C	14-28	1675	4	Own	4-5 x6	GorK	3
AndrewsKin.D	18-36	2500	4	Clim.	4-5 x6½	GorK	4
Appleton	12-20	1500	4	Buda	4-4¼x5½	G,K	2-3
Aro 1921	3-5	550	4	Own	1-4½x5	Gas.	1
Aultman-T	15-30	2200	4	Clim.	4-5 x6½	G,K	4
Aultman-T	22-45	3850	4	Own	4-5½x8	G,K	6
Aultman-T	30-60	5000	4	Own	4-7 x9	G,K,D	8
Automot. B-3	12-24	1785	4	Herc.	4-4 x5¼	Gas.	2-3
Avery.SR.Cul	5-10	....	4	Own	4-3 x4	G,K	..
Avery Cult-C	....	....	3	Own	6-3 x4	G,K	..
Avery B	5-10	....	4	Own	4-3 x4	G,K	2
Avery C	....	....	4	Own	6-3 x4	G,K	..
Avery	8-16	....	4	Own	2-5½x6	G,K,D	2-3
Avery	12-20	....	4	Own	4-4½x6	G,K,D	2-3
Avery	12-25	....	4	Own	2-6½x7	G,K,D	3-4
Avery	14-28	....	4	Own	4-4½x7	G,K,D	3-4
Avery	18-36	....	4	Own	4-5½x6	G,K,D	4-5
Avery	25-50	....	4	Own	4-6½x7	G,H,D	5-6
Avery	45-65	....	4	Own	4-7¾x8	G,K,D	8-10
Bates	15-25	....	4	Own	4-4¼x6	Ker.	3
Bates Mule H	15-25	....	4	Midw	4-4⅛x5¼	Gas.	3
Bates Mule F	18-25	....	*2	Midw	4-4⅛x5¼	Gas.	3
Bates Mule G	25-35	....	*2	Midw	4 4½x6	Gas.	com.
Bean	8-16	....	*1	Own	4-3⅞x4	G,K	2-3
Beeman G	2-4	315	4	Own	1-3½x4½	Gas.	½
Best	30	....	*2	Own	4-4¾x6½	G,K,D	4
Best	60	....	*2	Own	4-6½x8½	G,K,D	8-9
Boring 1921	....	1850	3	Wauk	4-4⅜x5¼	GorK	2
Burn-Oil 1921	15-30	1650	4	Own	2-6¾x7	Ker.	3-4
Capital	15-30	1000	2	Own	4-4⅜x6	Gas.	3
Case	10-18	1090	4	Own	4-3⅞x5	GorK.	2
Case	15-27	1680	4	Own	4-4½x6	GorK	3
Case	22-40	3100	4	Own	4-5½x6¼	GorK	4-5
Caterpillar T11	25	....	*2	Own	4-4¾x6	Gas.	4
Caterpillar T16	40	....	*2	Own	4-6½x7	Gas.	6
Centaur	5-21½	455	2	NWay	2-4½x4½	G or K	1-9
Chase	12-25	2100	3	Buda	4-4¼x5½	GorK	2-3
Chicago 40	40	2500	4	Own	4-4½x6	Gas.	4
Cletrac W	12-20	1495	*2	Own	4-4 x5½	G,K,D	2-3
Dakota 4	15-27	1750	3	Dom.	4-4¾x6	Gas.	3
Dart B.J.	15-30	2100	4	Buda	4-4½x6	Gas.	3-4
Depue A	20-30	2500	4	Buda	4-4½x6	Gas.	4
Dill D	20	2480	4	Cont.	4-4½x5½	Gas.	3
Dill R.W.	20-	2980	4	Midw	4-4½x6	Gas	3
Do-It-All	-7	595	..	Own	1-4½x5	Gas.	..
Eagle F	12-22	1390	4	Own	2-7 x8	GorK	3-4
Eagle F	16-30	1850	4	Own	2-8 x8	GorK	4-5
E-B AA	12-20	1445	4	Own	4-4¾x5	GorK	3
E-B Q	12-20	925	4	Own	4-4¾x5	GorK	3
E-B	16-32	2000	4	Own	4-5¼x7	GorK	4
Evans	18-30	2000	4	Buda	4-4½x6	G,K	3
Fageol D	9-12	1525	4	Lyc.	4-3½x5	Gas.	2
Farm Horse. B	18-30	1885	4	Clim.	4-5 x6½	G,K	3-4
Farquhar	15-25	....	4	Buda	4-4½x6	G,K,D	3-4
Farquhar	18-35	....	4	Own	4-6 x8	G,K,D	4-5
Farquhar	25-50	....	4	Own	4-7 x8	G,K,D	6-7
Fitch 4	20-35	....	4	Clim.	4-5 x6½	GorK	3-4
Flour City	20-35	....	4	Own	4-5¼x6	Ker.	4-6
Flour City	30-50	....	4	Own	4-6¾x7	Ker.	6-8
Flour City	40-70	....	4	Own	4-7½x9	Ker.	8-1
Fordson 20		625	4	Own	4-4x5	G,K	2
Fox E	20-40	3100	4	Own	4-5½x7½	G or K	4
Franklin G	18-30	4000	*2	Clim.	4-5 x6½	G or K	3-3
Franklin C	18-30	3350	*2	Clim.	4-5x6½	G or K	3-4
Franklin G 2	18-30	4350	2	Clim.	4-5 x6½	G or K	3-4
Frick A	12-20	....	4	Erd.	4-4 x6	G,K	2-3
Frick C	15-28	....	4	Beav.	4-4¾x6	G,K	3-4
G-O G	14-28	1485	4	Wauk.	4-4½x5¾	GorK	3
Grain Belt. A	18-36	2150	4	Wauk.	4-4¾x6¼	GorK	4
Gray 1920	18-36	$2000	3	Wauk	4-4¾x6¾	Gas.	4
Ground Hog	19-31	2000	4	Erd.	4-4 x6	GorK	3
Gt. Western St	20-30	1950	4	Beav.	4-4¾x6	K.	4
Hart-Parr 20	20	995	4	Own	2-5¼x6½	K.D	3
Hart-Parr 30	30	1595	4	Own	2-6½x7	K,D	3
Heider D	9-16	1170	4	Wauk	4-4¼x5¾	G,K	2
Heider C	12-20	1395	4	Wauk	4-4½x6¾	G,K	3
Heider Cult	6-10	1050	4	LeR.	4-3½x4½	Gas.	1
Hicks	20-30	....	4	....	4-4½x6	KorG	4
Huber Light 4	12-25	1185	4	Wauk	4-4½x5¾	GorK	3
Huber Super 4	15-30	1885	4	Midw.	4-4½x6	Gas.	3
Illinois, Super-Drive C	18-36	2500	4	Clim.	4-5 x6½	G,K	4
Imperial E	40-70	5000	4	Own	4-7½x9	G,K,D	10
Indiana F	5-10	....	2	LeR.	4-3⅛x4½	Gas.	1-2
International.	8-16	900	4	Own	4-4¼x5	G,K,D	2
International.	15-30	1750	4	Own	-5¼x8	G,K,D	4
J-T N	20-40	3485	*2	Chief	4-4¾x6	G,K,D	3-4
Klumb F	16-32	1650	4	Clim.	4-5 x6½	....	..
Knudsen, 1920	25-45	2500	4	Own	4-5 x9	Gas	4-6
LaCrosse M	6-12	900	4	Own	2-4 x6	G,K	1
LaCrosse G	12-24	1250	4	Own	2-6 x7	GorK	3
Lauson	12-25	1495	4	Midw.	4 4¼x5¼	Gas.	3
Lauson	15-25	1685	4	Beav.	4-4½x6	GorK	3-4
Lauson 21	15-30	1985	4	Beav.	4-4¾x6	GorK	3-4
Leader B	12-18	1095	4	Own	2-6 x6¼	G,K,D	2-3
Leader N	16-32	1985	4	Clim.	4-5 x6½	G,K	3-4
Leader GU	18-35	2775	*2	Clim.	4-5x6½	G,K	3-4
Leonard E	20-30	2530	4	Buda	4-4½x6	G,K	3
Liberty A	18-32	2475	4	Clim.	4-5 x6½	G,K	4
Linn H4J	40-	4500	*	Cont.	4-4½-5½	Gas	4
Linn W	60	5100	*	Wauk.	4-5 x6¼	Gas.	6
Little Giant. B	16-22	2200	4	Own	4-4½x5	K.	4
Little Giant. A	26-35	3300	4	Own	4-5½x6	K.	6
Lombard	85-150	....	*2	....	6-5½x6¾	Gas.	16
Lombard	50	....	*2	....	4-4¾x6½	....	6-10
Magnet B	14-28	1875	4	Wauk	4-4½x6¼	K&G	3
Master Jr	5-10	585	..	LeR.	-2¾x4	Gas.	1
Merry Gar 1921	2	230	2	Evin	1-2⅝x2½	Gas.	..
Minne All-P	12-25	1200	4	Own	4-4½x7	GorK	3
Minne. Gen.P.	17-30	1850	4	Own	4-4¾x7	GorK	3-4
Minne. Med.Duty	22-44	3300	4	Own	4-6x7	GorK	5-6
Minne. HeavyDuty	35-70	4600	4	Own	4-7½x9	GorK	8-9
Mohawk 1921	8-16	785	4	Light	4-3¼x4½	KorG,	1-2
Moline Univ D	9-18	990	2	Own	4-3½x5	Gas.	2-
Moline Orch	9-18	1075	2	Own	4-3½x5	Gas.	2-3
Motor Macult.	1½	195	2	Own	1-2¾x3½	Gas.	..
Motox	15-30	2250	4	Buda	4-4½x6	Gas.	3-4
NB 1	3-6	425	4	Own	2-3¼x4	Gas.	¾
NB * 2	3-6	425	4	Own	2-2¾x4	Gas.	¾
Nichols-Shep. 20-42	20-42	3100	4	Own	8 x10	GorK	3-6
Nichols Shep. 25-50	25-50	3460	4	Own	9 x12	GorK	4-7
Nilson Jr. E	15-25	1775	4	Wauk	4-4¼x5¾	G or K	3
Nilson Senior	20-40	2475	5	Wauk	4-5 x6¼	G,K	4
Oil Pull K	12-20	1485	4	Own	2-6 x8	K,D	3
Oil Pull H	16-30	2285	4	Own	2-7 x8½	K,D	4
Oil Pull G	20-40	3175	4	Own	2-8 x10	K,D	5-6
Oil Pull E	30-60	4590	4	Own	2-10x12	K,D	8-10
Oldsmar GarK	2½-5	395	4	Own	1-3½x5½	Gas.	2½
Oliver A	15-30	....	*2	Beav.	4-4½x6	GorK	3-4
Once Over Tiller Mark 6	12-25	3000	4	Strns	4-4½x6	Gas.	2
Parrett K	15-30	1950	4	Pitt	4-4½x6	G,K	3
Peoria L	12-25	1785	4	Clim.	4-5 x6½	G,K	3
Pioneer G	18-36	....	4	Own	4-5½x6	G,K,D	4
Pioneer C	30-60	....	4	Own	4-7 x8	Gas.	10
Planet Jr.	5-10	950	2	LeRoi	4-3½x1½	Gas	1
Plowman. A	15-30	1995	4	Buda	4-4½x6	G,K	3-4
Port Huron. A	12-25	$1700	4	Chief	4-4¾x6	G,K	3
Post D	12-20	1800	4	Wauk	4-4¼x5¾	GorK	2
Prairie Dog. L	9-18	650	3	Wauk	4-3⅜x5¼	Gas.	2
Prairie Dog. D	15-30	1250	4	Wauk	4-4½x6¼	Gas.	3
Ranger Cul. T-20	8-16	....	4	LeR.	4-3½x4½	Gas.	1
Reed	15-30	2750	4	Dom	4-4¾x6	K.	3-4
Reed A-1	18 36	2400	4	Dom	4-5 x6	Gas.	4
Reliable	10-20	985	4	Own	2-6 x7	Ker.	2
Rex	12-25	1600	4	Wauk	4-4¼x5¾	GorK	3
Russell	12-24	1500	4	Own	4-4½x5¾	GorK	2-3
Russell	15-30	2200	4	Own	4-5 x6½	GorK	3-4
Russell	20-35	3000	4	Own	4-5½x7	GorK	4-5
Russell	30-60	5000	4	Own	4-8 x10	GorK	8-10
Samson M	.....	795	4	Nov.	4-4 x5½	G,K	2
Sandusky J	10-20	1250	4	Own	4-4¼x5½	G,K,D	2
Sandusky E	15-35	1750	4	Own	4-5 x6½	G,K,D	4
Shawnee Com	6-12	....	2	LeR.	4-3⅛x4½	Gas.	10
Shawnee Com.	9-18	....	2	Gray	4-3½x5	....	..
Shelby D	15-30	....	4	Beav.	4-4¾x6	G,K	3
Shelby C	10-20	....	4	Erd.	4-4 x6	GorK	2-3
Short Turn	20-40	1500	3	Beav.	4-4¾x6	G,K	3
Square T A	18-35	2075	3	Clim.	4-5 x6½	K,G	3
Steady Pull	12-24	1485	4	....	4-4 x5	Gas.	3
Stinson 4E	18-36	1835	4	Beav.	4-4¾x6	G,K	4
Stone	20-40	2250	4	Beav.	4-4¾x6	G,K	4
Tioga 3	15-27	2625	4	Wisc.	4-4½x6	Gas.	3-4
Titan	10-20	900	4	Own	2-6½x8	G,K,D	3
Topp B	30-45	3500	4	Wauk	4-4¾x6¾	Gas.	3-4
Toro Cultivator	6-10	....	3	LeR.	4-3⅛x4½	Gas.	2
Townsend	10-20	1200	2	Own	4-6½x7	Ker	2-3
Townsend	15-30	1800	2	Own	4-7 x8	Ker	3-4
Townsend	25-50	3000	2	Own	4-8½x10	Ker	4 8
Traction Motor	40-50	....	4	....	8-3¼x5	Gas.	4 5
Traylor TB	6-12	715	4	LeR.	4-3⅛x4½	Gas.	1
Triumph H	18-36	2450	2	Erd.	4-4¾x6	Ker.	4
Trundaar 10	25-40	3750	*2	Wauk	4-5 x6¼	G or K	4
Turner 1921	14-25	1295	4	Buda	4-4¼x5½	G,K	3
Twin City	12-20	1580	4	Own	4-4¾x6	G,K	3
Twin City	20-35	3175	4	Own	4-5½x6¾	G,K	5
Twin City	40-65	5250	4	Own	4-7¾x9	G,K	8
Uncle Sam C20	12-20	1385	4	Weid.	4-4 x5½	G	2-3
Uncle Sam B19	20-30	2300	4	Beav.	4-4¾x6	G or K	3-4
Uncle Sam D21	20 30	1985	4	Beav.	4-4¾x6	G or K	3-4
Universal	1-4	475	2	Own	1-3½x5	G	1
Utilitor 501	2½-4	380	4	Own	1-3½x4½	G	5-6
Velie Biltwell	12-24	1750	4	Own	4-4½x5½	G,K,I	3
Victory 1921	9-18	1350	4	Gray.	4-3½x5	Gas.	2
Victory 1921	15-30	1750	4	Wauk	4-4¼x5¾	Gas.	3
Vim B	15-30	1650	4	Wauk	4-4¾x5¾	G,K	3
Wallis K	15-25	1600	4	Own	4-4¼x5¾	G,K	3
Waterloo N	12-25	....	4	Own	2-6½x7	G,K	3
Webfoot 53	28-53	5250	*2	Wisc.	4-5¾x7	G,D	6
Wellington B	12-22	900	4	Erd.	4-4 x6	Ker.	2-3
Wellington F	16-30	1400	4	Chief	4-4¾x6	Ker.	3-4
Western. 1920	16-32	2100	4	Clim.	4-5x6½	Gas.	4
Wetmore	12-25	1650	4	Wauk	4-4 x5¾	G,K	3
Wharton E	12-20	1800	3	Buda	4-4¾x6½	Gas.	2
Whitney	9-18	1175	4	Own	2-5½x6½	Gas.	2
Wichita T	15-30	2500	4	Beav.	4-4½x6	G,K,D	3-4
Wisconsin E	16-30	2250	4	Clim.	4-5 x6½	ker.	4
Wisconsin H	22-40	3200	4	Clim.	4-5½x7	Ker.	5
Yuba 15-25	15-25	2945	*2	Wisc.	4-4¼x6	G,K,D	..
Yuba 25-40	25-40	4892	*2	Wisc	4-5¾x7	G,K,D	..
Zelle	12-25	....	4	....	4-4¼x5½	G or K	3

ABBREVIATIONS: G—Gasoline, K—Kerosene, D—Distillate. Plow capacity varies in relation to operating conditions. Figures are based on 14 in. plows. Engine Make; Beav.—Beaver, Clim.—Climax, Cont.—Continental, Dom.—Domas, Evin.—Evinrude, Herc.—Hercules, LeR.—LeRoi, Midw.—Midwest, Nway.—New Way, Nor.—Northway, Strns.—Stearns, T.C.—Twin City, Wauk.—Waukesha, Weid.—Weidely, Wis.—Wisconsin, *—Crawler type. All others are wheel type.

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Toronto, Canada	National Motor Show	Aug. 27
Toronto, Canada	Canadian National Exposition	Aug. 29—Opens
Milwaukee	State Fair Automobile Show	Aug. 29—Sept. 3
Indianapolis	Automobile and Accessory Show	Sept. 6-10
Cincinnati	Fall Automobile Show	Oct. 1-8
Olympia, England	Automobile Show	Nov. 3-12
Chicago	Automotive Equipment Show	Nov. 14-19
New York	Automobile Salon	Nov. 27-Dec. 3
Chicago	Automobile Salon	January, 1922
New York	National Automobile Show	Jan. 7-13, 1922
Chicago	National Automobile Show	Jan. 28—Feb. 3, 1922
Minneapolis	Tractor Show	Jan. 30 to Feb. 4, inclusive
Winnipeg, Canada	Canadian Automotive Equipment Ass'n Show	Feb. 6-11

RACES

Pikes Peak	Hill Climb	September 5
Uniontown Speedway	Annual Autumn Classic	September 5
Los Angeles	Speedway Race	November 24

FOREIGN SHOWS

Buenos Aires, Argentina	Passenger Cars and Equipment	September
Luxemburg	Luxemburg Agricultural Sample Exhibition	September
Paris, France	Paris Motor Show	Oct. 5-16
London	British Motor Show, Society Motor Mfgs. and Traders	Nov. 4-11

CONVENTIONS

Chicago	Twenty-eighth Annual Convention National Implement & Vehicle Association	Oct. 12-24
Cleveland	National Tire Dealers' Association	November
Chicago	Chicago Semi-Annual Convention of Factory Service Managers N. A. C. C.	Nov. 22-24
New York	Service Managers Convention	Nov. 22-24

Business Notes

Nu-Top Dressing Co. is the new corporate style adopted by the National Weather Proof Paint Co. of Milwaukee, which has been for several years manufacturing a line of finishes and other specialties of this character. At present the production is concentrated largely on dressing compounds for motor car bodies and tops.

Service Auto Spring Co., Milwaukee, manufacturer and jobber in motor vehicle springs, shock absorbers, etc., has changed its corporate title to Widmeyer Auto Spring Co.

E. A. Haertlein has been appointed sales manager of the Gemco Mfg. Co., Milwaukee, a large manufacturer of automotive equipment and garage fixtures. He succeeds George H. Treviranus, who resigned to become associated with a new concern now in process of organization in Milwaukee to engage in the manufacture of rowboat motors and other small internal combustion engines.

H. J. Edwards, formerly manager of the Knight-American Patents Co., and also connected with the Willys-Overland engineering department at Elyria, O., has resigned these positions. His future plans have not been decided upon.

G. L. Newton & Co., Waterville, Wash., have sold out to J. L. Eddins & Sons of Cheney, Wash. No future plans have been announced.

Kleiber Motor Truck Co., San Francisco, has opened a new factory branch in Seattle, with F. G. Batenburg, for three years Kleiber dealer here, as manager of the branch.

Chevrolet Motor Co., factory branch Seattle, has been closed and the retail sales have been centered with the Fred S. Haines Co. Haines is one of the pioneers of the automobile business on the coast.

Dodge Brothers contract for the western Indiana territory has been assigned to Irby Brothers, a new sales organization formed at Terre Haute, Ind., for the purpose of taking over the contract. S. P. Irby and his brother, J. R. Irby, are the organizers of the company.

T. & S. Motor Sales Co., of this city, has been appointed distributor for the Haynes car in New London and Windham counties. Directors are Charles M. Tredennick and Eliot B. Stretch, until recently connected with the Connecticut Telephone and Electric Co. of Meridan, Conn., and S. Victor Prince, local lawyer and judge of New London.

Hare's Motors to Continue Without Mercer Company

New York, Aug. 12—Notwithstanding the impending reorganization of the Mercer Motors Co. and the cancellation by Hare's Motors of its contract with that corporation, Hare's Motors will not be dissolved but will continue to function as at present. It will continue as the selling agency for the Kelly-Springfield Truck Co. and probably for the Locomobile Co.

The arrangement with Locomobile will depend upon the decision of the creditors with regard to an extension of their claims pending a possible reorganization, but it is considered practically certain such an agreement will be reached. The extension granted by Locomobile creditors expired July 31, but between 85 and 90 per cent of the creditors already have agreed to a further extension which will run for at least six months.

There will be no change in the personnel of Hare's Motors, and even if it is found necessary to liquidate Locomobile it is expected that other lines will be added as opportunity offers.

Stockholders of Mercer Motors will meet Aug. 11 to pass upon the reorganization plan, and its ratification is regarded as certain.

TAKE a little time off now and then and polish up your equipment. Nothing like having sharp tools, good jack and similar stuff to impress customers and save your time!

Buckeye Farmers, Labor, in Battle Line Against Roads

Toledo, Aug. 12—Organized farmer and labor of Ohio have begun a serious fight against the carrying out of road construction contracts let this week by the state highway department which provide for the building of nearly 100 miles of new highway with an expenditure of nearly $3,000,000.

The contracts have had included in their provisions the fact that any lowering of freight rates will result to the benefit of the state.

But even though the contracts place the cost per mile about $36,000 as an average for all kinds of improved roads, the labor organizations say that that figure does not represent the decrease in wages taken by labor this summer, and the farmers declare that under the circumstances the road building at that cost must await the return to normalcy.

They point out that the same roads were built before the war for $10,000 a mile.

It is doubtful whether the road-building campaign will be interfered with this summer as the contracts have been let legally. However, the result of the agitation may be to suspend contemplated projects next summer.

FORMS NEW ACCEPTANCE COMPANY

Milwaukee, Aug. 12—Executives of the Sterling Motor Truck Co. of Milwaukee appear as the principals in the incorporation of the Motors Acceptance Co., Milwaukee, which has been organized with an authorized capitalization of $200,000 to do a general trade and commercial acceptance business, handling automotive business especially. The incorporators are Frank Luick, secretary, and Oscar E. Held, treasurer, of the Sterling Co., and Victor L. Brown, 1428 First Wisconsin National Bank Building, Milwaukee, one of the founders and for many years president of the Sterling company, who retired from office about a year ago to engage in financial affairs.